G. B. C.

CALENDAR

1969-1970

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General Information

The George Brown College of Applied Arts and Technology

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[illegible] 6 [illegible]

[illegible] Campus [illegible]

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The George Brown College of Applied Arts and Technology

21 Nassau Street/Toronto 2B, Ontario
Telephone 362-3971

Learn to Be Useful

To be useful and to be needed, both by society and by people, is fundamental to one's individual freedom, personal security and happiness.

C. C. Lloyd

Board of Governors

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Chairman, The Metropolitan Toronto School Board

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Director of Education, Toronto Board of Education

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Toronto City Council

The College

History and Government

The George Brown College of Applied Arts and Technology is one of Twenty Community Colleges in Ontario established by the Ontario Government. The College was formed in 1967 by the merging of two famous trade schools—The Provincial Institute of Trades and Occupations and the Provincial Institute of Trades. Governing responsibility rests in the hands of a twelve-man Board of Governors.

As the Toronto-area Community College, it is a multi-purpose institution offering certificate and diploma programs in technical, applied arts, and business fields.

The Campus

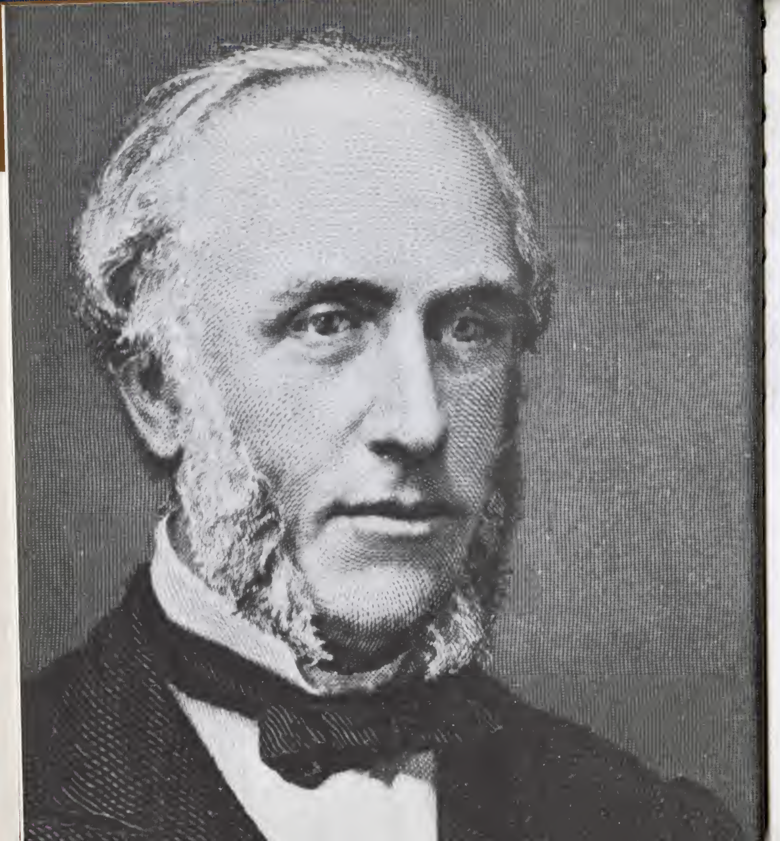
The College has, at the present time, six campuses. Changes in each campus are continually in progress to keep up with the rapid increase in student enrollments.

The Library

A library is located on each campus. Each library provides a selection of texts, periodicals, and materials related to the courses offered on that particular campus, as well as books and magazines for browsing.

Library hours on each campus are
Monday-Thursday: 8.00 a.m. to 10.00 p.m.
Friday: 8.00 a.m. to 6.00 p.m.

Students are invited to use the library facilities at any time during these hours for reference, borrowing, studying or relaxation.



George Brown/1818-1880

Statesman—Politician—Journalist—Father of Confederation

Son of Peter Brown, an Edinburgh merchant, and Isabella Mackenzie, George Brown was born forty miles up the Forth at Alloa, November 29th, 1818. He grew up in the Citadel of Scottish Education and within the High School and Southern Academy of Edinburgh.

At the age of twenty, George Brown migrated, with his father Peter Brown, to New York where, in 1842, they established the British Chronicle, a journal for British emigrants. In 1843, the Browns moved to Toronto where they launched the Banner (1843-1848), a Free Church Presbyterian weekly. In 1844 Brown founded the Globe as a weekly, and in 1853, it became a daily.

George Brown was a man of deep convictions. Under his forceful editorship the Globe became a leader of political and educational enterprise. This was manifest when the Globe, in 1853, having absorbed its two main reform rivals, became a daily which acquired an influence unequalled by any Canadian journal since that day.

Through the pages of the Globe, and the spell of his forthrightness, George Brown dominated the Liberal Party for over two decades.

George Brown opposed all church-affiliated schools. He advocated representation by population, to give large population groups in western Canada their proper place in the Assembly. He ardently advocated the annexation of Hudson's Bay lands. His hastily reorganized Reform Party, which swept the western polls in 1857, was in 1858 put out of power after Brown had ruled two days as Premier of the province.

1864 led George Brown to bold statesmanship when he agreed to enter a coalition government with his Conservative rivals and the day he rose and walked forward to meet Sir John A.Macdonald in the Assembly he made possible the birth of Confederation.

Naturally, strong individualists could not always see eye to eye, and it was a distinct loss when he resigned from the government in 1865. However, he still ardently worked for and supported Confederation until its consummation. Sir John A.Macdonald, political giant that he was, so weakened Brown's leadership by taking able Liberals into his cabinet that in the elections of Confederation year 1867, George Brown was defeated.

George Brown withdrew from active politics, but exercised his editorial power through the leadership given in the pages of the Globe. In 1873, Alexander Mackenzie appointed him to the Senate where his influence was cut short in his sixty-second year by a bullet fired by a disgruntled employee. May 8th, 1880, was coronation day for a great Scot, a commanding journalist, an ardent politician, and a Founding Father.

The George Brown College is dedicated to the principles enunciated by this great man. Human dignity is founded not only upon political freedom but also on the development of skills and knowledge that allow one to make a significant contribution to the well-being of the community.

Calendar/1969

September

S		7	14	21	28
M	1	8	15	22	29
T	2	9	16	23	30
W	3	10	17	24	
T	4	11	18	25	
F	5	12	19	26	
S	6	13	20	27	

October

S		5	12	19	26
M		6	13	20	27
T		7	14	21	28
W	1	8	15	22	29
T	2	9	16	23	30
F	3	10	17	24	31
S	4	11	18	25	

November

S		2	9	16	23	30
M		3	10	17	24	
T		4	11	18	25	
W		5	12	19	26	
T		6	13	20	27	
F		7	14	21	28	
S	1	8	15	22	29	

December

S		7	14	21	28
M	1	8	15	22	29
T	2	9	16	23	30
W	3	10	17	24	31
T	4	11	18	25	
F	5	12	19	26	
S	6	13	20	27	

September 2/Registration
All programs one year or shorter in length
September 2/Registration of Apprentices

All programs two years or longer in length
September 8/Registration

October 13/Thanksgiving Day (College closed)
October 27/Registration of Apprentices

Calendar/1970

January

S		4	11	18	25
M		5	12	19	26
T		6	13	20	27
W		7	14	21	28
T	1	8	15	22	29
F	2	9	16	23	30
S	3	10	17	24	31

February

S	1	8	15	22
M	2	9	16	23
T	3	10	17	24
W	4	11	18	25
T	5	12	19	26
F	6	13	20	27
S	7	14	21	28

March

S	1	8	15	22	29
M	2	9	16	23	30
T	3	10	17	24	31
W	4	11	18	25	
T	5	12	19	26	
F	6	13	20	27	
S	7	14	21	28	

April

S		5	12	19	26
M		6	13	20	27
T		7	14	27	28
W	1	8	15	22	29
T	2	9	16	23	30
F	3	10	17	24	
S	4	11	18	25	

May

S		3	10	17	24	31
M		4	11	18	25	
T		5	12	19	26	
W		6	13	20	27	
T		7	14	21	28	
F	1	8	15	22	29	
S	2	9	16	23	30	

June

S		7	14	21	28
M	1	8	15	22	29
T	2	9	16	23	30
W	3	10	17	24	
T	4	11	18	25	
F	5	12	19	26	
S	6	13	20	27	

July

S		5	12	19	26
M		6	13	20	27
T		7	14	21	28
W	1	8	15	22	29
T	2	9	16	23	30
F	3	10	17	24	31
S	4	11	18	25	

August

S		2	9	16	23	30
M		3	10	17	24	31
T		4	11	18	25	
W		5	12	19	26	
T		6	13	20	27	
F		7	14	21	28	
S	1	8	15	22	29	

January 5/Registration of Apprentices

March 2/Registration of Apprentices
March 27/Good Friday (College closed)
March 30/Easter Monday (College closed)

April 27/Registration of Apprentices

May 18/Victoria Day (College closed)

The Student

Admission Requirements

Applied Arts, Business and Technician Programs

i) Programs two years or longer in length
The Ontario Secondary Graduation Diploma with related options awarded after successful completion of any four or five-year program. Secondary School graduates who lack the appropriate options for admission will be required to take a special summer preparatory program.

ii) Programs one year or shorter in length
a) As stated in the course description.
b) The Ontario Department of Education Statement of Standing awarded after the successful completion of Grade 10 of any Four-Year Program, or as noted. Many of the programs in this category are available under the Ontario Manpower Retraining Program, a government-subsidized educational program for adults. Courses so available are indicated with the program descriptions. Application for a course under the O.M.R.P. can only be made through the nearest Canada Manpower Centre.

iii) Admission as a mature student
Persons of 19 years and over who do not meet the admission requirements, but who appear to have the capacity and maturity to succeed in the College, will be admitted to an appropriate program as probationary students.

iv) Admission with advanced standing
The College grants advanced standing for college-level study completed at other accredited institutions. Students contemplating transfer are urged to study carefully the programs in this calendar to determine the relevance of their present course work to the program desired. A student must be in good standing at the last institution attended to be eligible for admission.

Apprenticeship Programs

Under an agreement between the Industrial Training Branch of the Department of Labour and the College, apprenticeship programs are offered for *Registered Apprentices Only.* For general information, consult the section Apprenticeship Courses.

Admission Procedure

Application forms may be obtained from your Secondary School Guidance Office or from the Registrar, George Brown College, 21 Nassau Street, Toronto 2B, Ontario. Application forms must be accompanied by *one* of the following documents:
i) An official transcript of all secondary school marks, showing the necessary credits and grades for admittance to the desired program, *or*
ii) A statement from the Secondary School Principal stating that the applicant is expected to obtain the necessary credits and grades for admittance to the desired program. This statement must be substantiated by an official transcript of marks when it becomes available.

All applications are reviewed by the Board of Admission which is empowered to defer, reject or recommend an alternate program for any candidate whose qualifications in the opinion of the Board are not adequate to the demands of the program which the candidate wishes to pursue.

Probationary Status

Students who have been accepted but do not meet the published prerequisites for a program, and students who are re-admitted after a failure (a grade-point average less than 2.0) are placed in probationary status. If a probationary student has not achieved a 2.0 grade-point average by the end of the semester, he will be required to withdraw.

Transfer Credits

Students who wish to have courses taken elsewhere credited to the program in which they wish to enrol must apply in writing to the Registrar at or before the end of the first week of their course. Their work will be evaluated and credited to their program where applicable.

Equivalent Standing

Applicants from another Province are required to submit evidence of equivalent standing. The following certificates are recognized as being equivalent to the Ontario Secondary School Graduation Diploma, and may be accepted if the applicants meet the other admission requirements:

Alberta/Junior Matriculation (Grade 11)
British Columbia/Junior Matriculation (Grade 12)
Manitoba/Grade 11
New Brunswick/Junior Matriculation (Grade 12)
Newfoundland/Grade 11
Nova Scotia/Junior Matriculation (Grade 11)
Prince Edward Island/First Class License or Second Year Certificate of Prince of Wales College
Quebec/Quebec High School Leaving or McGill Junior Matriculation
Saskatchewan/Grade 11

Registration Dates for the Academic Year 1969-70

i) All programs one year or shorter in length
Sept. 2, 1969.
ii) All programs two years or longer in length
Sept. 8, 1969.
A student is not considered duly registered and will not be admitted to classes until all fees are paid in full.
Additional programs will be offered at various times throughout the school year. Starting dates are available upon request.
Programs will be given only if enrolment is sufficient.

The Student Administrative Council
All students of the College are members of the S.A.C.

Its purpose is to unite the students within a functioning body, which provides opportunity for the formulation, expression and extension of student ideas.

The S.A.C. endeavours to co-ordinate all phases of co-curricular activity other than the field of Athletics. The S.A.C. represents the Student Body at College functions, and on public occasions. Through its Standing Committees, it organizes such inter-school and College activities as may be of interest to the Student Body as a whole.

The affairs of the S.A.C. are administered by an elected executive. The following clubs and committees come under the jurisdiction of the S.A.C.:
1. The College hockey team—a competing member of the Toronto Inter-College Hockey League and the O.C.A.A. (Ontario College Athletic Association).
2. The Camera Club.
3. The Seathan Year Book and Globe Student Newspaper.
4. Social Committee.

Athletics
The opportunity is provided for every member of the Student Body to participate in the Athletic Program.

The Athletic Director operates a highly developed plan for Inter-House League Sports. Ice Hockey, Table Tennis, Chess, Volleyball, Basketball, Badminton and Floor Hockey are areas of interest.

The George Brown College is a member of the O.C.A.A. This College has competent teams entered in the Volleyball, Basketball, and Ice Hockey areas.

Intramural Sports
The Intramural Program is run by the Athletic Association consisting of a President, Vice-President, Secretary, Treasurer and one representative from each Campus. The Program includes volleyball, basketball, floor and ice-hockey, badminton and table tennis.

Minor Athletic Clubs
Clubs for any Athletic activity may be organized by calling a meeting of interested students, electing officers, and submitting a constitution to the Athletic Director for approval.

Regulations
1. The College does not accept responsibility for injuries sustained by Students taking part in Intramural or College sports. Students should see that they are insured with O.M.S.I.P. and O.H.S.C. to cover doctor's services and hospitalization. First aid treatment only is provided at the College Health Centre.

2. Students who plan to participate in Athletics should note carefully the following excerpts from the "Regulations Governing Discipline" and from the Constitution of the Athletic Association:
a) No one shall be allowed to represent The George Brown College of Applied Arts and Technology in any public Athletic contest, either individually or as a member of any team, unless he is a member of the Association.
b) The Director shall have full control of the use of the College's name by athletic clubs, and no schedule of matches, races, or athletic games, arranged by a College Club, shall take effect until approved by the Athletic Director.
c) The Director shall have control and direction of any facilities connected with athletics, and shall make such rules and regulations as are deemed necessary for their management. The Director shall give priority to such arrangements as may be necessary to effect the carrying out of the College regulations requiring physical training.
d) The Director shall have absolute power to suspend anyone from the privileges of the Athletic Association and also from the right to take part in College Athletics, for any breach of the regulations.

Medical Facilities
Health Centres for the use of students and staff are provided in each Campus for
a) Emergency care for accident and illness occurring at school.
b) Elective care for illness of a non-acute nature to enable a student to stay at school for the day or to offer him support until he can contact another agency.
c) Referral to practitioners and special clinics.
d) Consultation (by appointment) with the Health Centre physician on personal problems.
e) A broad program of Health Education.
f) Some miscellaneous services such as, active immunization against tetanus and poliomyelitis, smallpox vaccination, infra-red therapy and facilities for rest.
These centres are staffed by nurses and physicians who are registered in the Province of Ontario.
All registered students are covered by accident insurance while in the college. We recommend that every student seek protection by O.M.S.I.P. and O.H.S.C. Information in regard to these plans is available upon request in the offices at the respective campus Health Centres.

Mutual Responsibility Agreement
The acceptance of a student at The George Brown College of Applied Arts and Technology constitutes an agreement of mutual responsibility. The student's part of the agreement is to accept established college rules and practices, to respect the laws of the city and province, and to act in a responsible manner appropriate to these laws, rules and practices. The college's part is to provide an environment that encourages student growth and development. The college recognizes that the great majority of students accept and fulfill their parts of the agreement. Disciplining action on the part of the college must be taken when a student is persistently irresponsible.

Finances

Fees
Tuition fees for one full academic year (2 semesters):
$175.00 (this includes tuition fees, student activity fees and insurance. $10.00 administrative fees are non-refundable.)

Tuition fees for one-semester courses:
$87.00 (this includes tuition fees, student activity fees and insurance. $10.00 administrative fees are non-refundable.)

Note: Shorter programs will be calculated on a pro rata basis. Fees are payable to The George Brown College of Applied Arts and Technology.

Refund Schedule

Full refund of tuition fees will be granted if requested by letter and submitted to the Registrar's office prior to the 6th day of instruction.
One-half of tuition fees will be granted if requested by letter and submitted to the Registrar's office prior to the 41st day of instruction.
No refund will be granted after the 40th day of instruction.

Additional Expenditures
i) Textbooks, instruments, and supplies should be purchased by the student as soon after registration as possible. The cost of such items varies, according to the course, from forty dollars to one hundred dollars. Students are invited to use the facilities of the College Bookstore.
ii) Although uniforms and equipment are supplied to the members of the College teams, such students must be prepared to pay for the incidental expenses incurred on the trips for out-of-town games.
iii) Students who wish to retain projects constructed in the College must pay for the materials.

Living Accommodation
Residence accommodation for out-of-town students is not provided by the College. The Student Administrative Council maintains a list of boarding and rooming facilities in Toronto. Students are given every possible assistance in finding the type of accommodation suitable to their needs. The classified advertising columns of the daily newspapers are also recommended as an excellent source of information.
Rates vary from $20.00 to $30.00 per week for room and two meals. The College operates cafeterias at all campuses.

Transportation
Reduced fares on the "Go" train are available through the office of the Director of Student Affairs and students are encouraged to commute by train, T.T.C. and subway whenever possible.

Financial Assistance

Ontario Student Awards Program
The applicant must be a Canadian citizen or have landed immigrant status and have resided in Canada for a period of at least 12 consecutive months. In addition:
a) The parents of dependent students must be permanent residents of Ontario.
b) An independent student who is a Canadian citizen or a landed immigrant must have been a permanent resident of Ontario for at least 12 consecutive months immediately prior to first enrolling in the academic program for which he is requesting financial assistance.

The Ontario Student Awards Program has been developed to ensure that every person with the ability and desire to pursue a program of education beyond the secondary school level will have sufficient funds to meet the costs of such an undertaking. While it is felt that, in the first instance, the responsibility for providing the necessary funds rests with the parent (guardian or immediate family) and/or the student, the Province of Ontario is prepared to supplement family/student resources, as determined by an objective form of need assessment. In this way all citizens of the Province may be assured that opportunities in education and that available funds are being distributed to students on a fair and equitable basis.

A Student Loans Plan has been established by the Federal authorities, with the agreement of the participating provinces. Loans awarded under the Plan are interest free until six months after graduation or discontinuance of study, and no repayment of principal is required so long as the applicant is enrolled as a full-time student. At that time he will begin to repay the total amount he has borrowed, together with interest calculated at the present rate of 5¾% per annum. The method and the rate of repayment is arranged directly between the student and the bank at which the loan was negotiated.

Application forms are available at the office of the Director of Student Affairs, The George Brown College, 21 Nassau Street, Toronto 2B, at any time after June 1st.

Employment Service
The College assists students in obtaining placement both during the summer vacation and after graduation. Further information is available through the local campus Registrar.

Apprentice Programs

The courses outlined in this section of the calendar are offered in co-operation with the Industrial Training Branch of the Department of Labour under the provisions of the Apprenticeship and Tradesmen's Qualification Act, 1964. Every eligible person above the age of sixteen years, employed in a capacity other than a journeyman in a designated trade must be registered and under contract with the Industrial Training Branch of the Department of Labour. Under the terms of the Act, apprenticeship contracts are written in terms of periods of hours rather than calendar periods as was the case prior to 1964.

In addition to on-the-job training, all registered apprentices are required to attend regular day classes consisting of trade theory and practice, and academic subjects relating to their trade at a College of Applied Arts and Technology.

The in-school period normally consists of three courses. The initial (basic) course of 7 to 8 weeks duration is usually conducted during the first or second period of the apprenticeship contract. A second (intermediate) course of 7 weeks duration would follow and be held during the second or third period of the contract. The third (advanced) course is also 7 or 8 weeks but it would be conducted in the latter period of the apprenticeship contract. In the trades of Baker and Chef, these apprentices attend a 15-week basic course in their initial period of apprenticeship followed by a 15-week advanced course prior to their completing the final apprenticeship period. Apprentices in the trades of Barber and Hairdresser attend one 18-week course only. Retail Meat Cutter apprentices are only required to complete a 15-week course.

These courses are arranged by the Department of Labour under a Federal-Provincial training agreement and are free of charge to registered apprentices. To cover the cost of room and board, living allowances are paid by the Federal Department of Manpower and Immigration or the Ontario Department of Labour while the apprentice is attending school. For out-of-town apprentices the cost of transportation is provided to and from the training centre at the beginning and end of each course.

In certain of the trades requiring compulsory certification of qualifications, persons in possession of the Secondary School Graduation Diploma granted upon completion of Grade 12 of either the Science Technology and Trades Branch or the Arts and Science Branch are granted credit for a specific number of hours from each period of the apprenticeship term. In addition to the preceeding, persons in possession of a Grade 12 diploma endorsed in a subject corresponding to the apprenticeship program to be pursued will be excused from taking the basic course of in-school training. Where credit is applicable it is so stated under the course outline of the trade so affected.

It is important to note that these courses are available to *Registered Apprentices Only*. Prospective apprentices may obtain further information by writing to:

Director, Industrial Training Branch, Ontario Department of Labour,
74 Victoria Street, Toronto, Ontario.

The following apprenticeship courses are offered at this College:

Baking
Barbering
Carpentry
Chef Training
Electrical Construction
Hairdressing
Iron Worker
Lathing
Machinist
Masonry
Millwright
Painting and Decorating
Plastering
Plumbing
Radio and Television
Refrigeration and Air Conditioning
Retail Meat Cutting and Butchery
Sheet Metal Mechanic
Steamfitting
Structural Steel Drafting
Toolmaking
Watchmaking

Note: As it is necessary to prepare the materials for this Calendar well in advance of the beginning of each school year, revisions to the length of the apprenticeship term and the length of the in-school training period cannot be anticipated.

Bursaries and Scholarships

Many construction, industrial and commercial companies support the College directly with the gifts or loan of highly specialized equipment. Others provide financial support for students they sponsor. In addition to this, the following bursaries and scholarship are available.

The George Brown College of A.A.T. Faculty Award
Each year the faculty recognizes a student who, besides maintaining a satisfactory academic and technological status, has distinguished himself by his contribution to the extra-curricular life of the college. The award is a monetary prize, determined by the Awards Committee.

The Upper Lakes Shipping Company Deck Officer Cadet Award/$100
Awarded annually to the deck officer who stands highest in his class in the first year.

The Upper Lakes Shipping Company Marine Engineering Cadet Award/$100
Awarded annually to the marine engineering officer cadet who stands highest in his class in the first year course.

The Society of Plastics Engineers-Ontario Section Bursary/up to $100
This fund enables the College to grant bursaries to deserving students, enrolled in the Plastics Technician Course of up to $100. Applications should be made to the Registrar.

Toronto Study Club of Dental Technicians Award/$50
Awarded annually to the student who stands highest in his class at the end of the second year of the Dental Technician course. The award also includes a one-year membership in the Toronto Study Club.

The Crystophane of Canada Award/$100
Awarded annually by the Crystophane Company of Canada to the top all-round student of the year.

The Gordon Wragg Scholarship Award/$100
To be presented to the student who makes the most important personal contribution to student life at the College while maintaining a high level of scholastic achievement.

The Director of Student Affairs Award/$50
To be selected by Student Administrative Council from among the student body.

The Florence Montgomery Bursary Award/$100
Awarded annually by the Toronto and District Branch of the Canadian Restaurant Association to the top all-round student graduating from the advanced course of Chef Training.

The Escoffier Club Bursary Award/$100
Awarded annually by the Escoffier Club of Toronto (Association of Professional Chefs) to the top all-round student graduating from the basic course of Chef Training.

New Courses

Several new courses are presently in the planning stage, some of which may be operative in the Fall of 1969. Information relative to these courses may be obtained by writing to: The Registrar, The George Brown College of Applied Arts and Technology, 21 Nassau Street, Toronto 2B or by phoning 362-3971.

The Curriculum

The George Brown College offers a wide variety of courses leading to vocational competence, to examination and official certification, and to the general enrichment of the individual student. While it is recognized that certain standards of proficiency in particular areas of study are necessary for employment in some vocations, it is also recognized that individual students bring with them to the College certain established abilities, and that their needs differ widely. To provide for the greatest possible flexibility, the calendar describes programs which lead to particular vocations, and courses which make up these programs. Most students will wish to undertake a prescribed program, but others may:

1. Take an enriched program by adding to it another course.
2. Take a light program by omitting one or two courses.
3. Substitute courses for those within a program for which exemption or credit has been granted.
4. Take one or two courses at a time with a view to building program credit and certification.

Students who wish to apply for exemption from a course within a prescribed program should do so in writing during the third week of attendance at the College.
(Forms are available through the Department offices)

Grading and Grade Reporting

The following system of grading is used to indicate the quality of a student's work:

Grade	*Explanation*	*Point Value*
A	excellent	4
B	good	3
C	average	2
D	below average	1
F	failure	0
WP	withdrawn while passing	
WF	withdrawn while failing	
K	incomplete	

A course in which a student has failed must be repeated if credit is desired. A grade of F is assigned if a student fails to carry out the prescribed procedures when withdrawing from a course or from the College, or if he fails to clear a grade of K in the prescribed time. The grade of K indicates that work is satisfactory as far as completed. It permits the student after consultation with his department head to complete the work in a reasonable period of time. The grade of K is given only in cases of illness or other extenuating circumstances.

Promotion for Students Who Have Failed One or Two Courses

1. A student who has failed a course is permitted to pursue his successful courses in the following year.
2. A student with a grade point average of 2.5 or more may apply to pursue one unsuccessful course in the following year, provided that satisfactory arrangements are made to make up the deficiency.
3. A student with a grade point average of 3.0 or more may apply to pursue two unsuccessful courses in the following year provided that satisfactory arrangements are made to make up the deficiency.
4. A student may modify a standard program by making application for enrolment in his own selection of courses. On satisfactory completion of any course a certificate will be issued; however, a student completing any number of such courses will not receive a diploma unless he has completed a standard program.

Grade Point Average

A grade-point system is used to determine performance.
To determine a grade point average (GPA) divide the total grade points by the credit units of the course taken. The number following the title of a course indicates the credit unit value of the course in each program.

$$GPA = \frac{\text{Grade Points}}{\text{Credit Units}} \quad \text{(see glossary)}$$

A minimum grade-point average of 2.0 is needed to complete a program. Students may repeat courses in which a failing (F) or below average (D) grade has been received. Credit for a course is allowed but once in a program; both grades are counted in computing the grade-point average.

Glossary of Terms

Hour/One period on the timetable.

Session/Any course length less than 13 weeks.

Semester/Any course length of 13 to 26 weeks.

Core Subjects/Courses which are compulsory within a prescribed program which leads to a certificate or diploma.

Options/Alternative courses within a prescribed program.

Certificate/A certificate is issued upon satisfactory completion of a prescribed program less than 4 semesters in length.

Diploma/A diploma is issued upon satisfactory completion of a prescribed program 4 semesters or more in length.

Endorsement/Credits for additional courses taken along with a prescribed program. The credit appears on the face of the certificate or diploma earned.

Credit Unit/A unit used to indicate performance, that measures time spent according to the following table:

Type of Program	*Credit Units*	*Periods/Shop or Lab*	*Periods/Theory or Related Subjects*	*Per Semester or Session*
Apprentice	1	3	2	Session
Technician	1	2	1	Semester
Technical	1	2	1	Semester
Technical	1	3	1	Session

Note: Any fraction occurring (either 1/3 or 2/3) will be regarded as half a unit. Actual allocations are determined by the chairmen.

Grade Points/Result from credit units multiplied by the point value of the grade.

Grade Points Average (GPA)/Results from total Grade Points earned divided by credit units attempted.

Example:

Credit Units	Grade	Grade Points
3	B (3)	9

The number of a program indicates the length of the program as follows:

1-39	Technician
(*programs of 4 semesters or more*)	
40-69	Technical
(*programs of less than 4 semesters*)	
70-99	Apprentice

The number of a course indicates the year and division of the program as follows:

10-19	First Year Apprentice
20-29	Second Year Apprentice
30-99	Third Year Apprentice
100-129	First Year Technician
130-159	First Year Technical
160-199	First Year Applied Arts
200-229	Second Year Technician
230-259	Second Year Technical
260-299	Second Year Applied Arts

Applied
Arts

The George Brown College
of Applied Arts and Technology

Engineering Technol
Applied Arts
Architectural Technology
Business and Commerce
Electrical/Electronics

Applied Arts
Programs of Study

Child Care Worker/Ap1

Child Care Workers are responsible for the twenty-four hour care of children living away from their homes. Children whose behaviour is disturbed need skilled care. Courses are offered in infant, child and adolescent growth and development and in the nature of disturbed behaviour.

Total care requires a thorough knowledge of child health and illness, first aid and home nursing, and an insight into psychosomatic disturbances. Skills in program planning are considered in detail as well as an understanding of the meaning these have for children. Programs include craft work, indoor and outdoor games, camping and swimming and other leisure-time activities.

Knowledge of the function of the family and the place of the individual in society provides understanding of the social environment from which many disturbed children come and conditions which contribute to child and family breakdown.

Visits of observation to agencies and institutions in the city and province are provided. Students are instructed in legislation affecting the welfare, protection and care of children, and in the historical circumstances leading to the creation of welfare agencies.

Child Care Work is concerned with children from six years to the end of adolescence. Practical experience is gained through field work where students are under the direction of skilled supervisors who advise and guide the students in their care of disturbed and sick children.

Child Care Workers find employment in provincial institutions and treatment centres, and in private social agencies, group homes and hospitals.

First Year

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
CHI	160	Field Practice	8	16
CHI	161	Child Study I	4	4
CHI	162	Health and First Aid	2	4
CHI	163	Function of the Family	1	1
CHI	164	Caring for the Disturbed Child	2	2
CHI	165	Activities with Children	2	2
CHI	166	Social Services	2	3
CHI	167	Psychiatric Seminar	1	1.5
			22	33.5

Second Year

CHI	260	Field Practice	12	24
CHI	261	Child Study II	2	2
CHI	263	Individual in Society	2	2
CHI	264	Therapy of Play	1	1
CHI	265	Activities with Children	2	2
CHI	266	Introductory Psychology	2	2
CHI	267	Psychiatric Seminar	1	1.5
			22	34.5

Dental Technician/Ap2

Dental technology is concerned with all aspects of dental laboratory procedures such as dentures, bridgework, ceramics, partial dentures, Orthodontic appliances etc. A technologist trained in these procedures is called a dental technician.

The dental technician may be employed by one dentist or he may operate a laboratory alone; he may be the owner of a laboratory employing a few or many technicians or he may be an employee in a laboratory owned by an individual or a firm.

The dental technician will find much satisfaction in knowing that he is rendering an essential health service through the dental profession to the public. Another source of pleasure is the infinite variety of the work itself and the artistry and skill involved in doing it.

With the guidance and advice of a committee representing both the Royal College of Dental Surgeons of Ontario, and the Governing Board of Dental Technicians, a 3-year program of studies is provided. This will include the theory and practice of all aspects of dental laboratory work and will include a related subject program designed to give insight to the problems of small business management. Eighty per cent of the course will consist of practical laboratory work.

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DENT 100	Dental Lab. and Lec. I	13	19
DENT 101	Dental Materials	1	1
DENT 102	Dental Anatomy	1	1
ENG 100	English	2	2
DENT 103	Science of Dental Materials	2	2
CHEM 107	Chemistry	2	2
EC 100	Economics (Semester I)	1	1
MATH 107	Technical Mathematics	2	2
		24	30

Second Year

DENT 200	Dental Lab. and Lec. II	15	21
ENG 200	English	2	2
DENT 203	Science of Dental Materials	2	2
MATH 207	Business and Bookkeeping	2	2
CHEM 207	Chemistry	2	2
EC 200	Economics (Semester II of EC 100)	1	1
		24	30

Third Year

DENT 300	Dental Lab. III	20	26
EC 300	Business Management	2	2
MET 300	Metallurgy	2	2
		24	30

Jewellery Arts/Ap40

Occupations in this field are as many and varied as the variety of decorative products which come from the jewellers bench. Specialization is growing, and in the province of Ontario, this program alone is designed and listed as a certified two year course. The initial ten weeks in the program are devoted to the care and use of tools and equipment, introduction of basic processes and techniques, and elementary design. During the balance of the term students select an area of concentration from, jewellery making, diamond setting, engraving, or silver-smithing. Graduates are offered a third year of advanced studies and are excused from regular course outline. Depending on the degree of specialization, graduates find employment in the jewellery industry, manufacturing companies, engraving firms, or retail jewellery shops.
Length of Course: 2 Years
Entrance Requirements: Grade 12 or equivalent

First Year

Course Designation	*Course Content*
JWL 160	Introduction to Jewellery and or Silversmithing
ENG 132	Language and Communication
SBM 132	Small Business Management
MET 130	Metallurgy
Elective: either	
JWL 161	Goldsmithing
or 162	Diamond Setting
JWL 163	Engraving *or*
JWL 164	Silversmithing

Second Year

MET	Metallurgy
Specialization: either	
JWL 261	Goldsmithing
JWL 262	Diamond Setting
JWL 263	Engraving
or	
JWL 264	

depending on First Year Option

Teaching Techniques/Ap41

The increasing pace of technological advancement in industry and commerce is changing our traditional concepts of education. No longer is it possible to view education as a preparation for life; it is in fact a continuous lifelong process of adaptation and change to suit the needs of the individuals in a rapidly-changing environment. More and more adults find themselves in the formal classrooms of traditional educational institutions learning new bodies of knowledge or new techniques while others manage to make the adjustments demanded of them by an exercise of their own ingenuity and self-directed learning. Between these two positions is a large volume demand for training on the job. Industrial and commercial enterprises are increasingly faced with the necessity of training and retraining their employees. To accomplish this many people in factories and offices find that their full-time occupation is that of an instructor as they adapt people to new skills and techniques or prepare them to take supervisory positions. Although there is a great demand for skilled manpower at present, a greater problem over the next ten or twenty years will be the preparation of people for promotion.

This course has been designed to help instructors improve their teaching skill, to acquaint them with a greater variety of techniques and to broaden their understanding of the teaching-learning process as it concerns adult education. This is essentially a practical course concerned with practices and techniques. It introduces only as much pedagogical theory as is essential to a rudimentary understanding of the processes involved.
Length of Course: Three Weeks
Admission Requirements: Anyone who is employed as an instructor or who may expect to be so employed.

ED 160 Teaching Techniques

Watchmaking/Ap42

This course is designed to prepare students for employment in jewellery stores as watch repairers. In the Province of Ontario, where this trade is certified, the students usually enter a 4-year apprenticeship. Under an agreement with the Industrial Training Branch of the Department of Labour, graduates of this course are excused two years of the apprenticeship term. For the past several years a shortage of competent watchmakers has been noted throughout Canada and the United States and the employment opportunities for our graduates are excellent. Competent watchmakers are also in demand in precision industries and in space research industries. The watchmaking trade offers many opportunities for those who are aiming at self-employment.
Length of Course: 2 or 3 Years
Admission Requirements: Grade 10

First Year

Course Designation	*Course Content*
WATCH 130	Theory of Watchmaking
WATCH 131	Watchmaking Skills
SBM 132	Small Business Management
ENG 132	Language and Communication
MET 130	Metallurgy I

Second Year

WATCH 230	Theory of Watchmaking
WATCH 231	Watchmaking Skills
MET 131	Metallurgy II
SBM 232	Small Business Management
ENG 232	Language and Communication

Third Year

WATCH 330	Theory of Watchmaking
WATCH 331	Watchmaking Skills
ENG 332	Language and Communication
SBM 332	Economics

Barbering/Ap70

Length of Apprenticeship Term/Three periods of 1,800 hours each.
Length of In-School Training Program/18 weeks, conducted at the beginning of the apprenticeship term.

Course Designation		*Course Content*
BAR	10	Barbering Theory
BAR	11	Barbering Practice
EC	10	Small Business Management
ENG	11	English

Hairdressing/Ap71

Length of Apprenticeship Term/Three periods of 1,500 hours each.
Length of In-School Training Program/15 weeks, conducted at the beginning of the apprenticeship term.

Course Designation		*Course Content*
HAIR	10	Theory of Hairdressing
HAIR	11	Hairdressing Practice
SBM	10	Small Business Management
ENG	11	English
PHYS	17	Applied Science

Architectural Technology

The George Brown College of Applied Arts and Technology

Architectural Technology
Business and Commerce

Architectural Technology Programs of Study

Air Conditioning Technician/Ar1

An air conditioning technician is concerned with the design, maintenance, and operation of air conditioning and refrigeration systems used in public buildings, storage facilities, and manufacturing activities.

The refrigeration and air conditioning industry provides many challenging opportunities. System design layout, equipment selection, contract supervision and sales promotion are among the many areas covered in this industry. Contact with manufacturing and wholesale organizations can widen the scope of interest.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
AIR	100	Principles of Refrigeration	4	4
AIR	101	Psychrometrics and Load Estimating	4	4
AIR	102	Refrigeration Lab	1.5	3
AIR	103	Air Conditioning System Design	5	5
MATH	100	Mathematics	4	4
ENG	100	Language & Communication	2	2
PHYS	100	Applied Physics I	3	3
EL	100	Electrical Fundamentals	3	3
DR	100	Technical Drawing	1.5	2
			28	30

Second Year

AIR	200	Refrigeration and Air Conditioning Lab Practices	2	4
AIR	201	Control Systems—(Electronic and Pneumatic)	8	8
AIR	202	Air Conditioning System Design	5	5
MATH	200	Mathematics	4	4
ENG	200	Language and Communication	2	2
MECH	102	Mechanics	2	2
EC	100	Economics	2	2
PHYS	202	Thermodynamics	3	3
			28	30

Civil Engineering Technician/Ar2

Survey Technician
Municipal Engineering Technician

The various branches of civil engineering deal with problems in all types of structures: bridges and buildings, piers and docks, highways, railways, and airports; in hydro-electric power development; drainage and irrigation works; in all aspects of municipal development: water supply, sewerage systems, and roads.

The Survey Technician course provides the basic theoretical and practical knowledge required for those who wish to enter surveying at the technician level. Skill is attained by intensive field work in surveying with modern equipment. Survey problems are worked out under field conditions and computed and recorded in the drafting room.

The course provides the basic training which leads to positions as technicians with municipal and provincial departments, engineering firms, and construction companies.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
SURV 100	Survey Computations and Drafting	5.5	8
SURV 101	Plane Surveying	5.5	8
CIV 100	Construction Materials and Methods	3	3
DR 121	Descriptive Geometry	1.5	22
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
PHYS 100	Applied Physics I	3	3
		24.5	30

Municipal Engineering Option

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
SURV 201	Advanced Plane Surveying	4	6
CIV 203	Transportation	4	4
CIV 202	Municipal Services	4	4
CIV 200	Structures	1.5	2
CIV 204	Codes and Specifications	2	2
SURV 202	Photogrammetry	2	2
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
EC 100	Economics	2	2
MECH 100	Mechanics	2	2
		27.5	30

Survey Option

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
SURV 201	Advanced Plane Surveying	4	6
SURV 200	Survey Computations and Drafting	2.5	4
CIV 202	Municipal Services	4	4
SURV 204	Legal Surveys	2	2
SURV 203	Practical Astronomy	2	2
SURV 202	Photogrammetry	2	2
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
EC 100	Economics	2	2
MECH 100	Mechanics	2	2
		26.5	30

Construction Technician/Ar3

With the guidance and advice of a committee representing the construction and allied industries, this course is designed to prepare young men to enter the construction industry in various capacities leading to positions as estimators, expeditors, building inspectors, building products salesmen, field engineers and superintendents. These positions are not seasonal in nature.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
CO 100	Building Construction	3.5	5
CO 101	Quantity Surveying I	6	6
CO 102	Mechanical Installations I	3	3
CO 103	Construction Materials	3	3
CO 104	Site Engineering	2.5	4
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	3	3
		27	30

Second Year

CO 200	Building Construction	2.5	4
CO 201	Quantity Surveying II	5	5
CO 202	Mechanical Installations II	4	4
CO 203	Contracts and Specifications	4	4
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
PHYS 100	Applied Physics I	2	2
EC 100	Economics	2	2
MECH 110	Mechanics of Materials	3	3
		28.5	30

Drafting Technician/Architectural/Ar4

This course is designed to provide technicians for architects' offices, construction companies, engineering firms, and government departments. The program of instruction is arranged to provide skills in architectural drawing, detailing, rendering, and model building; and to provide knowledge of architectural design, contracts, organization, and business relationships.

Graduates find employment as draftsmen, field representatives, building products salesmen, and expeditors.
Length of Course: 2 Years
Admission Requirement: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DR 102	Architectural Drafting I	6.5	10
ARCH 100	Materials and Methods	3	3
DR 111	Mechanical Drafting	2	3
SUR 110	Surveying	2	3
DR 120	Descriptive Geometry I	1.5	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	3	3
		24	30

Second Year

DR 202	Architectural Drafting II	6	9
ARCH 200	Materials and Methods	2	2
DR 115	Structural Drafting	1.5	2
ARCH 201	History of Architecture	1	1
DR 220	Descriptive Geometry II	1.5	2
CO 101	Quantity Surveying I	1	1
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
PHYS 100	Applied Physics I	3	3
EC 100	Economics	2	2
MECH 110	Mechanics of Materials	2	2
		26	30

Drafting Technician/General/Ar5

This course is designed to provide industry with a draftsman who has a general knowledge of all phases of construction and installations. A draftsman with this extensive background can be an asset to a drawing office in that he can offer his services in all areas of the architectural drafting operation.

Graduates find employment in architectural, engineering, structural and consulting offices, as well as government offices and private industries.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DR 106	Architectural Drafting I	4	6
DR 107	Mechanical Installation Drafting I	2.5	4
DR 108	Structural Drafting I	2	3
DR 109	Electrical Installation Drafting I	2.5	4
DR 120	Descriptive Geometry I	1.5	2
SURV 110	Surveying	1.5	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	3	3
		23	30

Second Year

DR 211	Architectural Drafting II	4	6
DR 208	Electrical Installation Dr. II*	4	6
DR 209	Structural Drafting II*	4	6
DR 210	Mechanical Installations Dr. II*	4	6
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
PHYS 100	Applied Physics I	3	3
MECH 110	Mechanics of Materials	3	3
		24	30

*any two as options

Drafting Technician/Piping Systems/Ar6

The Piping Drafting Technician is concerned with the drafting, design and installation of service piping for buildings and with suitably designed piping systems for the automated industrial processing of continuous flow materials as required for the chemical, process and petroleum industries and power plants. An increasing amount of industrial production is obtained by means of process piping, and as this trend continues, opportunities for employment in this interesting, creative field are enhanced.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DR 110	Building Construction	1.5	2
DR 115	Structural Drafting	2	3
DR 104	Piping Drawing	6.5	10
DR 118	Descriptive Geometry I	2.5	4
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	3	3
PHYS 100	Physics	2	2
		23.5	30

Second Year

DR 204	Process Piping Design	6.5	10
INST 102	Instrumentation Fundamentals	2	2
DR 222	Descriptive Geometry II	2.5	4
DR 225	Materials and Processes	2	4
MATH 200	Mathematics	4	4
MET 100	Metallurgy	2	2
MECH 210	Mechanics of Materials	2	2
CHEM 121	Chemistry	2	2
		23	30

An optional second year program for Materials Handling Drafting Technicians may be offered in the 1970/71 school year. This would give students an opportunity to study drawing, design, and systems as applied to bulk handling, ore extraction, mechanical conveyers, air and vacuum systems, packaging conveyors, and layout of plant equipment. This program would be at the Drafting Technician level and the program would include Drawing and Design, Handling Systems, Descriptive Geometry, Manufacturing Methods, Mathematics, Metallurgy and Mechanics of Materials.

Mechanical Systems Technician/Ar7

This course is designed to prepare technicians for positions in the construction industry. Modern, well-equipped shops and labs provide practical experience to reinforce the theoretical studies. Graduates of this course are employed as mechanical equipment technicians, estimators, expeditors, building representatives and sales representatives.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MECL 100	Building Construction	2.5	4
MECL 101	Plumbing Installations	5	5
MECL 102	Steamfitting Installations	5	5
MECL 103	Principles of Refrigeration	5	5
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	3	3
EL 100	Electrical Fundamentals	2	2
		28.5	30

Second Year

MECL 200	Building Construction	2.5	4
MECL 201	Plumbing Installations	4	4
MECL 202	Steamfitting Installations	4	4
MECL 203	Principles of Air Conditioning	5	5
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
PHYS 100	Applied Physics I	3	3
EC 100	Economics	2	2
EL 210	Electronic and Pneumatic Controls	2	2
		28.5	30

Drafting/General (Techniques)/Ar40

This course is designed to teach and develop all the modern techniques that a draftsman may encounter in any drafting or engineering office. The students will gain the experience of working with various types of media, of using all the modern instruments and of applying all the current methods presently being employed in the fields of drafting, tracing and technical illustrating.

Graduates of this course find employment in architectural and engineering offices, municipal and provincial offices and electrical or electronic offices. Students graduating from this program with honours standing will be considered for admission in the technician program.
Length of Course: 1 Year
Entrance Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DR 151	Architectural Drawing	6	9
DR 152	Mechanical Drawing	4.5	7
DR 153	Schematic Drawing	3.5	5
DR 154	Art and Presentation	2.5	4
MATH 130	Mathematics	3	3
ENG 130	Language and Communication	2	2
		21.5	30

Heating Mechanic/Ar41

(Formerly Oil Burner Servicing)

This course prepares the student to service completely many and varied types of oil burners. The student who successfully completes the course will be capable of performing complete annual overhauls and of providing efficient heating service during the heating season. He will be capable of adjusting burners so that they will operate with the highest possible combustion efficiency. He will have a general knowledge of the different types of heating systems, including gravity warm air, gravity hot water, forced hot water, and steam. He will also have a basic knowledge of electricity and pipe fitting. During the course, the importance of "customer relations", good workmanship, and neatness is continually stressed. The great scarcity of skilled servicemen gives students every expectation of rewarding employment upon graduation. Those who have the necessary business acumen and drive may seek to establish their own dealerships within a relatively short period of time.

During the past years, hundreds of thousands of oil burners have been installed in Canada. This expansion has brought with it demands for qualified personnel to install and maintain this equipment. Training and technical education in trade schools are playing their part in developing this corps of servicemen.
Length of Course: Two Semesters
Admission Requirements: Grade 10

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
HT 100	Domestic Oil Burners	3.5	5
HT 130			
HT 101	Oil Burners	5.5	8
HT 131			
HT 102	Heating	2	3
HT 132			
HT 103	Heating	2.5	4
HT 133			
PHYS 136	Applied Physics	2	2
MATH 134	Mathematics	4	4
ENG 130	Language and Communication	2	2
DR 131	Drafting and Blueprint Reading	1.5	2
		23	30

Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
HT 140	Oil and Gas Burners	2	3
HT 141	Heating	4	6
HT 112	Heating	2	3
HT 142			
HT 143	Heating	5.5	8
PHYS 136	Applied Physics	2	2
MATH 134	Mathematics	4	4
ENG 130	Language and Communication	2	2
DR 132	Drafting and Blueprint Reading	1.5	2
		23	30

Heating Technician/Ar42

The Heating Technician course is designed to develop a technician who can estimate, install, service, and sell domestic and commercial heating systems. By theoretical and practical instruction, the course aims to provide a thorough knowledge of the combustion of fuels, automatic controls, systems design, pipe fitting, and maintenance. The successful student will find rewarding employment with oil companies, heating and cooling companies, gas utilities and manufacturers of fuel burning equipment.

In the heating field, there is a considerable demand for technical personnel who are knowledgeable in oil, gas and electric heating and cooling systems. This demand has been created, in part, by the expansion of building construction.
Length of Course: 1 Year
Admission Requirements: Grade 12

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
HT 100	Domestic Oil Burners	3.5	5
HT 101	Oil Burners	5.5	8
HT 102	Heating	2	3
HT 103	Heating	2.5	4
PHYS 100	Applied Physics I	2	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
DR 100	Technical Drawing	1.5	2
		23	30

Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
HT 110	Heating	5.5	8
HT 111	Heating	4.5	7
HT 112	Heating	2	3
HT 113	Heating	1.5	2
PHYS 100	Applied Physics I	2	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
DR 100	Technical Drawing	1.5	2
		23	30

Taping/Drywall/Ar43

The emphasis in this course is directed toward the basic hand skill, mechanical procedures and trade techniques necessary for the development of competent mechanics within the taping field.
The course is structured to prepare graduates to become employable within the Drywall industry and to meet the ever growing demands of this industry for skilled Drywall Tapers.
Length of Course: 8 Weeks
Admission Requirements: Grade 8 or equivalent
Applicants should be fairly robust and have the general physique necessary for employment in the Construction industry.

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
TA 130	Taping/Drywall	8.5	23
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 131	Drafting and Blueprint Reading	1	2
		12	30

Refrigeration (Pre-Apprenticeship)/Ar44

This course is designed to prepare young men to enter an apprenticeship program leading to certification (compulsory in Ontario) as a journeyman refrigeration mechanic. This is an excellent opportunity for any young man who left school before completing grade 12 to enter a challenging trade that pays well and assures full-time employment. Under an agreement with Industrial Training branch of the Department of Labour, graduates of this course are granted equivalent time off the apprenticeship period and are excused the in-school requirements of the basic course (see Apprenticeship section).
Admission Requirements: Grade 10
Length of Course: One Semester

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
REF 130	Refrigeration Theory	9	9
REF 131	Refrigeration Practice	4.5	9
MATH 133	Mathematics	3	3
ENG 141	Language and Communication	2	2
PHYS 133	Applied Physics	2	2
DR 136	Drafting	2	3
WELD 140	Welding	1	2
		23.5	30

Carpentry/Ar70

Length of Apprenticeship Term
Four periods of 1,800 hours
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
CAR 10	Carpentry I	9	22
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 10	Drafting	1.5	3
		13	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
CAR 20	Carpentry II	9	22
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
DR 20	Drafting	1.5	3
		13	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
CAR 30	Carpentry III	9	22
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
DR 31	Drafting	1.5	3
		13	30

Lathing/Ar71

Length of Apprenticeship Term
Three periods of 1,800 hours
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
LATH 10	Lathing I	7.5	20
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 10	Drafting	1	2
WELD 10	Welding	1	3
		12	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
LATH 20	Lathing II	7.5	20
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
DR 20	Drafting	1	2
WELD 21	Welding	1	3
		12	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
LATH 30	Lathing III	7.5	20
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
DR 36	Drafting	1	2
WELD 31	Welding	1	3
		12	30

Masonry/Ar72

Length of apprenticeship term
Four periods of 1,600 hours
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
MAS 10	Masonry I	8.5	21
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 10	Drafting	1	2
WELD 10	Welding	0.5	2
		12.5	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
MAS 20	Masonry II	8.5	21
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
DR 20	Drafting	1	2
WELD 20	Welding	0.5	2
		12.5	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
MAS 30	Masonry III	8.5	21
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
DR 30	Drafting	1	2
WELD 30	Welding	0.5	2
		12.5	30

Painting and Decorating/Ar73

Length of apprenticeship term
Four periods of 1,800 hours
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PAINT 10	Painting and Decorating I	9	23
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 10	Drafting	1	2
		12.5	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PAINT 20	Painting and Decorating II	9	23
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
DR 20	Drafting	1	2
		12.5	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PAINT 30	Painting and Decorating III	9	23
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
DR 35	Drafting	1	2
		12.5	30

Plastering/Ar74

Length of Apprenticeship Term
Four periods of 1,600 hours
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLAS 10	Plastering I	9	23
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 10	Drafting	1	2
		12.5	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLAS 20	Plastering II	9	23
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
DR 20	Drafting	1	2
		12.5	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLAS 30	Plastering III	9	23
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
DR 36	Drafting	1	2
		12.5	30

Plumbing/Ar75

Length of apprenticeship course
Five periods of 1,800 hours.
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLUM 10	Plumbing I	9.5	22
MATH 10	Mathematics	1	2
ENG 10	English	0.5	1
PHYS 12	Applied Physics	0.5	1
DR 10	Drafting	1	2
WELD 10	Welding	0.5	2
		13	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLUM 20	Plumbing II	9.5	22
MATH 20	Mathematics	1	2
ENG 20	English	0.5	1
PHYS 22	Applied Physics	0.5	1
DR 20	Drafting	1	2
WELD 20	Welding	3.5	2
		13	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLUM 30	Plumbing III	9.5	22
MATH 30	Mathematics	1	2
ENG 30	English	0.5	1
PHYS 32	Applied Physics	0.5	1
DR 37	Drafting	1	2
WELD 30	Welding	0.5	2
		13	30

Refrigeration and Air Conditioning/Ar76

Length of Apprenticeship Term
Five periods of 1,800 hours.
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
REF 10	Refrigeration and Air Conditioning I	9	21
MATH 10	Mathematics	1	2
ENG 10	English	1	2
PHYS 15	Applied Physics	0.5	1
DR 18	Drafting	1	2
WELD 10	Welding	0.5	2
		13	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
REF 20	Refrigeration and Air Conditioning II	9	21
MATH 20	Mathematics	1	2
ENG 20	English	1	2
PHYS 25	Applied Physics	0.5	1
DR 28	Drafting	1	2
WELD 20	Welding	0.5	2
		13	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
REF 30	Refrigeration and Air Conditioning III	9	21
MATH 30	Mathematics	1	2
ENG 30	English	1	2
PHYS 35	Applies Physics	0.5	1
DR 38	Drafting	1	2
WELD 30	Welding	0.5	2
		13	30

Sheet Metal Mechanic/Ar77

Length of apprenticeship term
Five periods of 1,800 hours.
Grade 12 Credit (See Information on Apprentice Programs)
200 hours in each period.
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
SM 10	Sheet Metal Mechanic I	9.5	22
MATH 10	Mathematics	1	2
ENG 10	English	0.5	1
PHYS 13	Applied Physics	0.5	1
DR 10	Drafting	1	2
WELD 10	Welding	0.5	2
		13	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
SM 20	Sheet Metal Mechanic II	9.5	22
MATH 20	Mathematics	1	2
ENG 20	English	0.5	1
PHYS 23	Applied Physics	0.5	1
DR 20	Drafting	1	2
WELD 20	Welding	0.5	2
		13	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
SM 30	Sheet Metal Mechanic III	9.5	22
MATH 30	Mathematics	1	2
ENG 30	English	0.5	1
PHYS 33	Applied Physics	0.5	1
DR 39	Drafting	1	2
WELD 11	Welding	0.5	2
		13	30

Steamfitting/Ar78

Length of apprenticeship term
Five periods of 1,800 hours.
Grade 12 Credit (See Information on Apprentice Programs)
450 hours in each period.
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
STEA 10	Steamfitting I	9	21
MATH 10	Mathematics	1	2
ENG 10	English	0.5	1
PHYS 14	Applied Physics	0.5	1
DR 10	Drafting	1	2
WELD 10	Welding	0.5	1.5
WELD 11	Welding	0.5	1.5
		13	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
STEA 20	Steamfitting II	9	21
MATH 20	Mathematics	1	2
ENG 20	English	0.5	1
PHYS 24	Applied Physics	0.5	1
DR 20	Drafting	1	2
WELD 20	Welding	0.5	1.5
WELD 21	Welding	0.5	1.5
		13	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
STEA 30	Steamfitting III	9	21
MATH 30	Mathematics	1	2
ENG 30	English	0.5	1
PHYS 34	Applied Physics	0.5	1
DR 33	Drafting	1	2
WELD 30	Welding	0.5	1.5
WELD 31	Welding	0.5	1.5
		13	30

Structural Steel Drafting/Ar79

Length of apprenticeship term
Three periods of 2,000 hours.
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation		*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
STR	10	Structural Steel Drafting I	8	18
MATH	12	Mathematics	1.5	3
ENG	10	English	1	2
DR	11	Descriptive Geometry	2.5	7
			13	30

Intermediate Program

STR	20	Structural Steel Drafting II	8	18
MATH	22	Mathematics	1.5	3
ENG	20	English	1	2
DR	21	Descriptive Geometry	2.5	7
			13	30

Advanced Program

STR	30	Structural Steel Drafting III	8	18
MATH	32	Mathematics	1.5	3
ENG	30	English	1	2
DR	42	Descriptive Geometry	2.5	7
			13	30

Business and Commerce

The George Brown College of Applied Arts and Technology

CONTINUING EDUCATION CONTINUING EDUCATION CONTINUING EDUCATION CO

Engineering Technology
Business and Commerce
Electrical/Electronics

Business and Commerce Programs of Study

Accounting/B1

The graduate in this two-year program has been prepared for employment in accounting with public accounting firms, private industry and government service. The course combines an adequate theoretical base and practical application to provide a foundation for advanced positions in the accounting profession.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year/Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
MATH 114	Business Mathematics	5	5
EC 100	Economics	5	5
EDP 100	Introduction to Data Processing	4	4
AC 100	Accounting	4	8
BC 110	Business Law	3	3
		26	30

First Year/Semester II

ENG 100	Language and Communication	5	5
MATH 115	Mathematics of Finance	5	5
EC 101	Business Organization	4	4
AC 101	Accounting	6	8
AC 102	Accounting	6	8
		26	30

Second Year/Semester I

ENG 200	Language and Communication	5	5
MATH 116	Business Mathematics	5	5
EDP 100	Introduction to Computer Programming	4	4
AC 200	Accounting	6	8
AC 201	Accounting	6	8
		26	30

Second Year/Semester II

ENG 200	Language and Communication	5	5
MATH 215	Statistics	5	5
EC 213	Business Management	4	4
AC 202	Accounting	6	8
AC 203	Accounting	6	8
		26	30

Electronic Data Processing/B2

The graduate of this two-year program has been trained for immediate employment at a pre-professional level in accounting, marketing and management. His training emphasizes the programming and supervision of an electronic data processing department.

Length of Course: 2 Years
Admission Requirements: Grade 12

First Year/Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
MATH 114	Business Mathematics	5	5
EC 100	Economics	5	5
PSY 200	Psychology	5	5
EDP 100	Introduction to Electronic Data Processing	5	10
		25	30

First Year/Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
MATH 116	Business Mathematics	5	5
AC 100	Accounting	5	5
EC 101	Business Organization	5	5
EDP 105	Introduction to Computer Programming	5	10
		25	30

Second Year/Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 200	Language and Communication	4	4
MATH 214	Business Mathematics	5	5
EDP 200	Data Processing Computing Systems	4	8
EDP 205	Computer Programming	4	8
AC 200	Accounting	5	5
		22	30

Second Year/Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 200	Language and Communication	4	4
MATH 215	Statistics	5	5
AC 201	Cost Accounting and Control	5	5
EDP 201	Data Processing	4	8
EDP 206	Computer Programming	4	8
		22	30

Marketing/B3

The graduate in this two-year program has been prepared for employment in the fields of marketing and merchandising. The course introduces those aspects of the marketing process deemed most suitable to provide a basis for a variety of positions, not only in marketing and merchandising, but also in various related areas of commerce.

Length of Course: 2 years
Admission Requirements: Grade 12

First Year/Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
MATH 114	Business Mathematics	5	5
EC 100	Economics	5	5
BC 105	Principles of Marketing	5	10
EC 101	Business Organization	5	5
		25	30

First Year/Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
AC 100	Accounting	5	5
BC 100	Principles of Advertising	5	10
BC 110	Business Law	5	5
PSY 200	Psychology	5	5
		25	30

Second Year/Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 200	Language and Communication	4	4
MATH 214	Business Mathematics	5	5
EDP 100	Introduction to Electronic Data Processing	4	4
BC 205	Marketing	4	8
PSY 201	Business Psychology	5	5
BC 200	Advertising	4	4
		26	30

Second Year/Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 200	Language and Communication	4	4
MATH 215	Statistics	5	5
BC 201	Advertising and Sales Promotion	4	8
EC 213	Business Management	5	5
EDP 105	Introduction to Computer Programming	4	4
ES 215	Political Science	4	4
		26	30

Secretarial Science

The graduate of the one-year secretarial science program will have developed the skills in shorthand, typewriting and related areas necessary to meet the demands of a secretarial position.

The program provides the combination of secretarial skills and general knowledge required by the successful legal secretary or medical secretary.

Candidates must have the competence in shorthand and typewriting expected of a Grade 12 graduate of the secondary school business and commerce program.

Length of Course: 1 Year
Admission Requirements: Grade 12

Legal Secretary/B40

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
MATH 114	Business Mathematics	4	4
OP 114	Office Practice	5	5
OP 115	Typewriting	4	8
OP 105	Shorthand	4	8
		22	30

Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 110	Business Communications	5	5
AC 100	Accounting	4	4
BC 110	Business Law	5	5
OP 116	Legal Typewriting	4	8
OP 106	Legal Shorthand and Transcription	4	8
		22	30

Medical Secretary/B41

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
MATH 114	Business Mathematics	4	4
OP 114	Office Practice	5	5
OP 115	Typewriting	4	8
OP 105	Shorthand	4	8
		22	30

Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ENG 110	Business Communications	5	5
AC 100	Accounting	4	4
OP 108	Medical Terminology	5	5
OP 117	Medical Typewriting	4	8
OP 107	Medical Shorthand	4	8
		22	30

Electrical/ Electronics

The George Brown College of Applied Arts and Technology

Engineering Technology
Food Technology
Electrical/Electronics

Electrical/Electronic Programs of Study

Design Technician/El1 Electrical/Electronic

This course is designed to train design technicians in the field of Electricity and Electronics. The training combines an adequate theoretical base, practical knowledge, and workshop skills to provide a background for Drafting. In the second year the student selects either the Electronic or Electrical Option to provide design specialization. Electrical/Electronic Design Technicians ere employed by Local, Provincial and Federal Government Departments, Municipal and Provincial Hydro-electric Systems, Manufacturing Companies, Consulting Engineering Firms and Construction Companies.

First Year

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DR	103	Electrical Design Drafting	5	8
DR	112	Architectural Drafting	2	3
DR	111	Mechanical Drafting	2	3
EL	112	Electrical Laboratory	1	3
MATH	100	Mathematics	3	4
ENG	100	Language and Communication	2	2
EL	110	Electrical Fundamentals and Problems	3	3
ELTC	100	Electronic Fundamentals and Problems	3	3
EL	120	Materials and Methods	2	2
			23	31

Second Year (Electrical Option)

DR	227	Electrical Design Applications	4	6
EL	204	Electrical Machines	3	4
EL	205	Power and Distribution	3	3
EL	202	Electrical Laboratory	4	6
EC	102	Engineering Law and Administration	2	2
MATH	200	Mathematics	4	4
ENG	200	Language and Communication	2	2
PHYS	100	Applied Physics	3	3
			25	30

Second Year (Electronic Option)

DR	226	Electronic Design Applications	4	6
ELTC	211	Electronic Theory and Problems	6	6
ELTC	212	Electronic Laboratory	3	6
ELTC	202	Communication and Computer Systems	3	3
MATH	200	Mathematics	4	4
ENG	200	Language and Communication	2	2
PHYS	100	Applied Physics	3	3
			25	30

Electrical Technician/El2

This course is designed to provide the theory, skills and knowledge of industrial practices required of an electrical technician. Facilities include modern labs and equipment which reinforce electrical theory with practical experience. Opportunities for employment are found in electrical generation and distribution, communications, manufacturing, and building fields. Graduates are employed as draftsmen, servicemen, estimators, operators, and inspectors.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
EL 101	Electrical Measurements	1.5	1
EL 102	DC Machines	4	4
EL 103	Electrical Lab	4	8
EL 104	Electrical Fundamentals	5	5
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 102	Mechanics	3	3
DR 122	Electrical Drafting	1.5	3
		25	30

Second Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
EL 200	AC Machines	4	3.5
EL 205	Power and Distribution	2	2
EL 206	Industrial Electronic Control	4	3.5
EL 207	Electrical Lab	4	8
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
PHYS 100	Applied Physics	2	3
EC 110	Economics	2	2
DR 203	Electrical Drafting	1	2
		25	30

Electronics Technician/El3

This course is designed to provide engineering technicians to work in the design, research, production, maintenance, or installation phases of the electronic industry. The College is well supplied with laboratory space and modern equipment. A full range of equipment is available. The course is intensive and consistent hard work is necessary for successful graduation. Graduates of this course have been employed in research and engineering departments of government and industry, in utility companies, in radio and television broadcasting, in the oil industry, and in computer and communication systems installation.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
EL 100	Electrical Fundamentals	2	3
ELTC 100	Electronic Fundamentals	2	3
ELTC 101	Amplifiers	2	3
ELTC 102	AM/FM Receiver Circuits	2	3
ELTC 103	Semi-Conductor Circuits	3	3
ELTC 105	TV Principles	2	3
DR 116	Drafting	1.5	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 102	Mechanics	2	2
PHYS 100	Applied Physics	3	3
		25.5	31

Second Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ELTC 200	Transistor and Pulse Circuits	4.5	5
ELTC 201	Computer Systems	4.5	6
ELTC 202	Communication Systems	3	4
ELTC 203	Microwave Systems	3	4
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
PHYS 200	Modern Physics	3	3
EC 100	Economics	2	2
		26	30

Electric Motor Repair/El40

This course is designed to meet the specific needs of industry in a specialized electrical field, needs which previously established courses for electrical technicians or tradesmen have not satisfied.

In addition to providing the student with a sound basis in electrical theory, the course involves a detailed study of the principles of the construction and operation of DC, single phase and three phase motors. In the shop, the student is taught how to locate and identify faults and how to dismantle, re-wire and reassemble stationary and rotating electrical equipment.

The knowledge and skill acquired during the course prepares the student for employment in electric motor production plants and servicing shops.
Length of Course: 1 Year
Admission Requirements: Grade 10

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
EMR 140	DC Motors	3	4
EMR 141	Single Phase Motors	4	5
EMR 142	Three Phase Motors	7	8
MACH 144	Machine Shop	2	3
PHYS 137	Physics	2	2
MATH 136	Mathematics	3	4
ENG 130	English	2	2
DR 156	Blueprint Reading	1	2
		24	30

Electronics (General)/El41

The theory in this course is developed so that the principles involved in various circuits, modules and systems can be applied to all types of electronic equipment both domestic and commercial. To complement the theory, practical sessions in the laboratory are given on domestic equipment such as the radio, television, hi-fi and the record changer. With this background the graduate of this course is equipped to work effectively as a service technician in all electronic manufacturing companies, retail radio and television stores and in the small radio and television repair shop.
Length of Course: 1 Year
Admission Requirements: Grade 10

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ELTC 130	Electrical Fundamentals	4	4
ELTC 131	Electronic Fundamentals	4	4
ELTC 132	Radio and Sound Servicing	3	3
ELTC 133	Fundamentals Laboratory	5	10
DR 133	Drafting	1.5	2
MATH 131	Mathematics	3	3
PHYS 131	Physics	2	2
ENG 130	Language and Communication	2	2
		24.5	30

Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ELTC 134	Pulse Circuits	2	2
ELTC 135	Television Circuits	4	4
ELTC 136	Color Television and FM Multiplex	4	4
ELTC 137	Radio and Television Laboratory	5.5	11
DR 133	Drafting	1.5	2
MATH 131	Mathematics	3	3
PHYS 131	Physics	2	2
ENG 130	Language and Communication	2	2
		24	30

Electrical Construction/El70

Length of Apprenticeship Term
Five periods of 1,800 hours
Grade 12 Credit (See Information on Apprentice Programs)
200 hours in each period
Length of In-School Training Program
Basic Program: 7 weeks, conducted during the first or second apprenticeship period.
Intermediate Program: 7 weeks, 2nd or 3rd period.
Advanced Program: 8 weeks, conducted during fourth apprenticeship period.
Industrial Electronics Program: 7 weeks, conducted during fifth apprenticeship period. All apprentices graduating from the advanced course have the opportunity of taking this course on a voluntary basis.

Basic Program

Course Designation		*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
EL	10	Electrical Construction I	7	14
EL	11	Electrical Practice	2	8
MATH	10	Mathematics	2	3
ENG	10	English	1	2
DR	12	Drafting and Blueprint Reading	1	3
			13	30

Intermediate Program

EL	20	Electrical Construction II	7	14
EL	21	Electrical Practice	2	8
MATH	20	Mathematics	2	3
ENG	20	English	1	2
DR	22	Drafting and Blueprint Reading	1	3
			13	30

Advanced Program

EL	30	Electrical Construction III	7	14
EL	31	Electrical Practice	2	8
MATH	30	Mathematics	2	3
ENG	30	English	1	2
DR	32	Blueprint Reading	1	3
			13	30

Industrial Electronic Program (Elective)

EL	40	Industrial Electronic Controls	4	7
EL	41	Electrical Practice	7	19
WELD	11	Welding	2	4
			13	30

Radio and Television (Apprentice)/El71

Length of Apprenticeship Term
Four periods of 2,000 hours.
Length of In-School Training Program
First Year: 18 Weeks
Second Year: 18 Weeks

First Year

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ELTC	130	Electrical Fundamentals	4	4
ELTC	131	Electronic Fundamentals	4	4
ELTC	132	Radio and Sound Servicing	3	3
ELTC	133	Fundamentals Laboratory	5	10
DR	133	Drafting	1.5	2
MATH	131	Mathematics	3	3
PHYS	131	Physics	2	2
ENG	10	Language and Communication	2	2
			24.5	30

Second Year

ELTC	134	Pulse Circuits	2	2
ELTC	135	Television Circuits	4	4
ELTC	136	Color Television and FM Multiplex	4	4
ELTC	137	Radio and Television Laboratory	5.5	11
DR	133	Drafting	1.5	2
MATH	131	Mathematics	3	3
PHYS	131	Physics	2	2
ENG	20	Language and Communication	2	2
			24	30

Engineering Technology

The George Brown College of Applied Arts and Technology

Instrumentation Technician/En1

The increasing use of automation and automatic processes has resulted in the growth of the specialized field of instrumentation. The instrumentation technician is concerned with measurement and control devices used with complex automatic systems. The program of study presents theory and knowledge of these devices and is aimed at developing technicians who work precisely. College facilities include shops and laboratories which feature a wide range of modern precision equipment.

Instrumentation technicians are employed in government departments, universities, manufacturing plants, primary industries and research and development companies.

Graduates of the Technician program may be permitted to enrol in the Technologist program.

Length of Program: 2 Years
Admission Requirements: Grade 12

First Year/Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
INST 100	Measuring Principles	5	13
INST 103	Piping and Instrument Lab Techniques	1.5	4
EL 100	Electrical Fundamentals	2	2
ENG 100	Language and Communication	2	2
MATH 100	Mathematics	4	4
MECH 102	Mechanics	2	2
DR 100	Technical Drawing	2	3
		18.5	30

Semester II

INST 101	Electronic Instrumentation	6	9
INST 104	Telemetering	6	8
EL 100	Electrical Fundamentals	2	2
ENG 100	Language and Communication	2	2
MATH 100	Mathematics	4	4
MECH 102	Mechanics	2	2
DR 100	Technical Drawing	2	3
		24	30

Second Year/Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
INST 200	Automatic Control Principles I	2.5	7
INST 201	Final Control Elements	2.5	7
ELTC 100	Electronic Fundamentals	2	2
ENG 200	Language and Communication	2	2
MATH 200	Mathematics	4	4
PHYS 100	Applied Physics	3	3
EC 100	Economics	2	2
CHEM 100	Chemistry	2	3
		20	30

Semester II

INST 202	Analytical Instrumentation	5	7
INST 203	Computer Control Principles I	5	8
ELTC 100	Electronic Fundamentals	2	2
ENG 200	Language and Communication	2	2
MATH 200	Mathematics	4	4
PHYS 100	Applied Physics	2	2
EC 100	Economics	2	2
CHEM 100	Chemistry	3	3
		25	30

Plastics

The plastics department offers several programs of study in the processing, fabricating, and finishing of plastic materials. Facilities include shops, labs, and advanced equipment used in research.

In Canada, the growth rate of the plastics industry is more than double the industrial average. Over 1,100 companies are engaged in plastics; more than 600 of these firms are in Ontario.
This rapid expansion has created a strong demand for technicians at several levels.

Technician A is a two-year program requiring grade 12 with Physics, Chemistry, and Drafting.

Technician B is a one-year program requiring Grade 12 with Physics, Chemistry and Drafting. At this level, programs are offered which specialize in either *Thermoplastics* or *Thermosets*.

Operator's Certificate is a one-semester program requiring grade 10 with drafting. Four programs are offered:
Operator/Thermoplastic I (Machine Moulding)
Operator/Thermoplastic II (Forming and Fabricating)
Operator/Thermoset I (Hand Lay-up)
Operator/Thermoset II (Machine Moulding)

Plastics Theory and Techniques Technician "A"/En2

Total Length of Program: 2 Years

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
PL 100	Thermoplastic Materials	3	3
PL 103	Thermoset Materials	2	2
PL 110	Thermoplastic Processes	3	4
PL 113	Thermoset Processes	2	3
PL 120	Thermoplastic Design	3	3
PL 123	Thermoset Design	2	2
CHEM 110	Chemistry	3	4
PHYS 110	Physics	2	2
ENG 100	Language and Communication	3	3
MATH 100	Mathematics	3	3
EC 112	Business Organization	1	1
		27	30

Second Year

PL 200	Thermoplastic Materials	3	3
PL 203	Thermoset Materials	2	2
PL 210	Thermoplastic Processes	3	4
PL 211	Thermoset Processes	2	3
PL 220	Thermoplastic Design	3	3
PL 223	Thermoset Design	2	2
CHEM 210	Chemistry	3	4
PHYS 210	Physics	2	2
ENG 200	Language and Communication	3	3
MATH 201	Mathematics	3	3
EC 212	Business Organization	1	1
		27	30

Tool and Die Design Technician/En3

The aim of the Tool and Die Design Program is to develop the necessary theoretical and practical skills. The student studies and practices current design techniques. Through consideration of the factors which affect the efficacy of designed tools, he is encouraged to be imaginative, individualistic and critically analytical in seeking possible solutions to design and production problems. The student is taught the operating procedures and capacities of a variety of production and specialized machine tools. He studies Mathematics, Metallurgy, Metrology, Mechanics of Materials, so that his designs may be functional. In the course of his daily work routine, the designer is involved in liaison work between many company departments so that the study of language and communications in the English course is extremely important.

For the enterprising graduate, prospects of advancement exist in Production, Manufacturing and Industrial Engineering.

It should be noted that Toolmaking Technician and Tool Design Technician students undertake a common first year program so that they may have the choice of specializing in either area during the second year.
Length of Program: 2 Years
Admission Requirements: Grade 12 with either Machine Shop or Drafting Option.

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TD 100	Jig and Fixture Design I	2.5	3.5
TD 101	Jig and Fixture Design II	2.5	4
TD 102	Jig and Fixture Design III	1	1
TD 103	Jig and Fixture Design IV	1	1
MACH 120	Jigs and Fixtures I	1.5	2
MACH 121	Jigs and Fixtures II	1.5	2
MACH 122	Gauges	1.5	2.5
MACH 123	Diemaking	1.5	2
WELD 50	Welding	1	1
WELD 81	Welding		
TD 110	Metrology	2	2
MATH 100	Mathematics	4	4
MECH 100	Mechanics	3	3
ENG 100	Language and Communication	2	2
		25	30
PHYS 100	Physics Elective	2	2
EL 105	Electrical Fundamentals Elective	2	2
CHEM 100	Chemistry Elective	2	3

Second Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TD 200	Die Design I	3	4
TD 201	Die Design II	3	4
TD 202	Die Design III	3	4
TD 203	Die Design—Moulds	2	3
TD 204	Process Engineering	1	1
MACH 207	Diemaking	2	4
MET 100	Metallurgy	2	2
MATH 200	Mathematics	4	4
MECH 110	Mechanics of Materials	2	2
ENG 200	Language and Communication Options	2	2
		24	30
EC 100	Economics Elective	2	2
CHEM 100	Chemistry Elective	2	3
EL 105	Electrical Fundamentals Elective	2	2
PHYS 100	Physics Elective	2	2

Toolmaking Technician/En4

The Toolmaking Technician Program, provides instruction in the operation of standard machines, new machining techniques and manufacturing processes such as numerical control and high energy formation. Accuracy in machining and measurement is stressed

Shop sketching, drafting and blueprint reading enable the student to read and correctly interpret tool drawings and to appreciate problems of design and manufacture.

Mathematics helps him to understand and perform the numerous calculations involved in laying out work and setting-up machines. Metallurgy and Mechanics of Materials, aid in selecting, matching and heat treating materials. Metrology provides a scientific knowledge of measurement. English is studied because of its importance in communication while Economics provides knowledge of the financial aspects of industry and society. A Plastics course has been added to the program to prepare the technician for the plastics era.

Toolmaking Technician and Tool Design Technician students undertake a common first year program so that they may have the choice of specializing in either area during the second year.
Length of Program: 2 Years
Admission Requirements: Grade 12 with either Machine Shop or Drafting Option.

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TD 100	Jig and Fixture Design I	2.5	3.5
TD 101	Jig and Fixture Design II	2.5	4
TD 102	Jig and Fixture Design III	1	1
TD 103	Jig and Fixture Design IV	1	1
MACH 120	Jigs and Fixtures I	1.5	2
MACH 121	Jigs and Fixtures II	1.5	2
MACH 122	Gauges	1.5	2.5
MACH 123	Diemaking	1.5	2
WELD 50	Welding	1	1
WELD 81	Welding		
TD 110	Metrology	2	2
MATH 100	Mathematics	4	4
MECH 100	Mechanics	3	3
ENG 100	Language and Communication	2	2
		25	30

PHYS 100	Physics Elective	2	2
EL 105	Electrical Fundamentals Elective	2	2
CHEM 100	Chemistry Elective	2	2

Second Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MACH 203	Special Machine Techniques	2	3
MACH 204	Diemaking I	2	3
MACH 205	Diemaking II	2	3
MACH 206	Diemaking III	2	3
MACH 208	Numerical Control	2	2
PL 125	Plastics Fundamentals	2	2
TD 205	Die Design	2	4
MET 100	Metallurgy	2	2
MATH 200	Mathematics	4	4
MECH 110	Mechanics of Materials	2	2
ENG 200	Language and Communication Options	2	2
		24	30

EC 100	Economics Elective	2	2
CHEM 100	Chemistry Elective	2	2
EL 105	Electrical Fundamentals Elective	2	2
PHYS 100	Physics Elective	2	2

Drafting Technician/Mechanical/En5

Machines and mechanical devices of greatly sophisticated design are characteristic of modern industry today. The design drawings, schematics, detail drawings, and assembly drawings required to construct these machines are drawn by mechanical draftsmen. This program provides the student with the theoretical and practical knowledge which is required to meet the requirements of manufacturing companies and other industrial organizations in the general mechanical field.

Graduates may be employed as draftsmen, designers, process planners, salesmen, or estimators by manufacturing industries, consulting engineers and government departments.
Length of Program: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DR 101	Machine Drawing	8	11
MACH 110	Workshop Technology	2	4
DR 118	Descriptive Geometry	3	4
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	3	3
MET 100	Metallurgy	2	2
		24	30

Second Year

DR 201	Machine Drawing	6	8
MACH 201	Manufacturing Processes	2	4
DR 207	Kinematics	3	4
DR 222	Descriptive Geometry	3	4
MATH 200	Mathematics	4	4
PHYS 100	Applied Physics	2	2
MECH 110	Mechanics of Materials	2	2
ENG 200	Language and Communication Options	2	2
		24	30

EC 100	Economics Elective	2	2

Appliance Servicing/En40

This course is designed to give a thorough knowledge of the theory and practice required for the maintenance and repair of home appliances. The student should have a high mechanical aptitude. Students are prepared for such occupations as servicemen, factory representative, field representative, appliance salesmen, appliance inspector and production supervisor.
Length of Course: 1 Year
Admission Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
EL 133	Electrical	6	6
AP 130	Laundry Equipment	3.5	4
AP 131	Kitchen Equipment	2	3
AP 132	Refrigeration	4	6
AP 133	Gas Appliances	2	2
DR 155	Blueprint Reading	1.5	2
ENG 130	English	2	2
MATH 134	Mathematics	2	3
PHYS 138	Physics	2	2
		25	30

Business Machine Servicing/En41

This program is designed to provide the student with the theoretical and practical knowledge of various types of business machines; knowledge which is required of a business machine representative.

A business machine representative analyses and solves problems which occur on business equipment and assists customers to operate machines in a proper manner. The prospective representative should display a good mechanical aptitude, be neat and presentable, and be able to co-operate with other people. He should possess a current driving licence.

Because machines are increasing in number and in complexity, prospects in this occupation are excellent for the man who is ambitious and capable of working with a minimum of supervision.
Length of Program: 1 Year
Admission Requirements: Grade 12 (preferably) or Grade 10 and satisfactory completion of specified aptitude tests.

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
BM 101	Figuring Machines	7	10
BM 102	Photocopying Machines	1	1
BM 100	Typewriters	6	9
EL 130	Electricity	2	2
PHYS 130	Physics	2	2
MATH 134	Mathematics	3	3
DR 132	Blueprint Reading	1	1
ENG 130	Language and Communication	2	2
		24	30

Instrumentation Mechanic/En42

Instrumentation mechanics are required wherever industries are located. These include chemical plants, power plants, steel plants, pulp and paper plants, pipelines, refineries and the instrument companies which make, sell and service the instruments. Instrument men may work as field service representatives, in the base plant on manufacture, repair or calibration, or in process plants on instrument maintenance. Students graduating from this course with honours standing will be considered for admission to the Instrumentation Technician program.
Length of Program: 1 Year
Admission Requirements: Grade 10

First Semester

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
INST 130	Pneumatic Instrumentation	5	8
INST 131	Electronic Instrumentation	5	8
INST 132	Installation Techniques	1.5	4
MACH 130	Workshop Technology	0.5	2
MATH 132	Mathematics	3	3
ENG 130	Language and Communication	2	2
PHYS 132	Applied Physics	3	3
		20	30

Second Semester

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
INST 130	Pneumatic Instrumentation	5	8
INST 131	Electronic Instrumentation	5	8
INST 133	Analytical Instrumentation	1.5	4
DR 137	Applied Drawing	0.5	2
MATH 132	Mathematics	3	3
ENG 130	Language and Communication	2	2
PHYS 132	Applied Physics	3	3
		20	30

Lathe Operator/En43

This course is designed to prepare students for entry into industry as Lathe Operators. Persons who have completed Grade 12 and have an interest in the Machine Tool industry will find this course most suitable as preparation for initial employment as a Toolroom or Production Lathe Hand.
Length of Program: 1 Session
Admission Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MACH 137	Small Tools and Measurement	1	1
MACH 138	Lathe and Ancillary Equipment	5	21
DR. 140	Blueprint Reading	1	4
MATH 133	Mathematics	2	4
		9	30

Machine Shop Practice/En44

This course is designed to prepare students for entry into industry as machinists, apprentices, or machine operators. The category in which a student finds employment depends upon his age, previous experience, and the levels of skill and knowledge which he has acquired. Students find it advantageous to have completed Grade 12 in Machine Shop but, with suitable aptitudes and a willingness to work hard, those who have completed Grade 10 may prove successful in the course and later become good machinists.

Instruction is particularly concerned with measurement and machining to close tolerances, combined with production speeds and efficiencies of manufacture, sharpening cutting tools, and setting up machines.
Length of Program: 1 Year
Admission Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MACH 140	Benchwork	2	3
MACH 141	Lathework	3.5	6
MACH 142	Milling and Shaping	2.5	4
MACH 143	Grinding	2	3
DR 130	Blueprint Reading	2	4
MET 132	Metallurgy	2	2
MATH 136	Mathematics	4	4
PHYS 140	Physics	2	2
ENG 130	Language and Communication	22	30
		22	30

Plastics

The plastics department offers several programs of study in the processing, fabricating, and finishing of plastic materials. Facilities include shops, labs, and advanced equipment used in research.

In Canada, the growth rate of the plastics industry is more than double the industrial average. Over 1,100 companies are engaged in plastics; more than 600 of these firms are in Ontario. This rapid expansion has created a strong demand for technicians at several levels.

Plastics Theory and Techniques Operator/Thermoplastic I (Machine Moulding)/En45

Length of Program: 1 Semester

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
PL 130	Thermoplastic Materials	4	4
PL 133	Thermoplastic Processes	10	14
PL 136	Thermplastic Design	6	8
CHEM 135	Chemistry	1	1
PHYS 135	Physics	1	1
ENG 141	Language and Communication	1	1
MATH 133	Mathematics	1	1
		24	30

Plastics Theory and Techniques Operator/Thermoplastic II (Forming and Fabricating)/En46

Length of Program: 1 Semester

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
PL 131	Thermoplastic Materials	4	4
PL 134	Thermoplastic Processes	10	14
PL 137	Thermoplastic Design	6	8
CHEM 135	Chemistry	1	1
PHYS 135	Physics	1	1
ENG 141	Language and Communication	1	1
MATH 133	Mathematics	1	1
		24	30

Plastics Theory and Techniques Operator/Thermoset I (Hand Lay-Up)/En47

Length of Program: 1 Semester

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
PL 132	Thermoset Materials	4	4
PL 135	Thermoset Processes	10	14
PL 138	Thermoset Design	6	8
CHEM 135	Chemistry	1	1
PHYS 135	Physics	1	1
ENG 141	Language and Communication	1	1
MATH 133	Mathematics	1	1
		24	30

Plastics Theory and Techniques Operator/Thermoset II (Machine Moulding)/En48

Length of Program: 1 Semester

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
PL 140	Thermoset Materials	4	4
PL 141	Thermoset Processes	10	14
PL 139	Thermoset Design	6	8
CHEM 135	Chemistry	1	1
PHYS 135	Physics	1	1
ENG 141	Language and Communication	1	1
MATH 133	Mathematics	1	1
		24	30

Plastics Theory and Techniques Technician "B"/Thermoset/En49

Length of Program: 1 Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
PL 103	Thermoset Materials	4	5
PL 203			
PL 113	Thermoset Processes	4	8
PL 211			
PL 123	Thermoset Design	4	4
PL 223			
CHEM 110	Chemistry	3	4
PHYS 110	Physics	2	2
ENG 100	Language and Communication	3	3
MATH 100	Mathematics	3	3
EC 112	Business Organization	1	1
		24	30

Plastics Theory and Techniques Technician "B"/Thermoplastic/En50

Length of Program: 1 Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
PL 100	Thermoplastic Materials	5	5
PL 200			
PL 110	Thermoplastic Processes	5	7
PL 210			
PL 120	Thermoplastic Design	5	5
PL 220			
CHEM 110	Chemistry	3	4
PHYS 110	Physics	2	2
ENG 100	Language and Communication	3	3
MATH 100	Mathematics	3	3
EC 112	Business Organization	1	1
		27	30

Welding/Fabricating/En51

Modern welding processes are continuing to revolutionize the metal fabricating industries and will effect even greater changes as new processes are developed. Welding is an integral part of a great many trades and remains the most economical method of joining metals. Graduates of this program are well prepared to advance beyond the operator level to positions of responsibility; welding supervision, welding inspection, sales and manufacturers' representatives, are but a few. Students graduating from this program will be considered for the Welding Specialist program, which is designed to prepare graduates to proceed toward positions in the welding industry at the technician level.
Length of Program: 1 Year
Entrance Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
WELD 140	Oxy-Acetylene Welding, Brazing and Cutting/ Theory and Practice	2	3
WELD 141	Electric Arc Welding/Theory and Practice	6	10
WELD 142	Fabrication/Theory and Practice	3	5
WELD 143	Inert Gas Welding/Theory and Practice	1.5	2
WELD 144	Pipe Welding/Theory and Practice	1.5	2
DR 134	Plate and Structural Layout	1	2
DR 135	Blueprint Reading	1	2
MATH 136	Mathematics	2	2
ENG 130	Language and Communication	2	2
		20	30

Welding Operator/En52

This program provides an excellent opportunity for any man between 16 and 50 to learn a useful skill in a relatively short period of time and to enter a well paying trade at a mechanic's level. Because welding is an integral part of a great many trades, graduates of this course experience little difficulty in finding suitable employment. Evening courses in special welding techniques are readily available for the ambitious person wishing to prepare for advancement.
Length of Program: 1 Semester
Admission Requirements: Grade 8 minimum

The grade 10 prerequisite is waived for this program. Prospective candidates should have a minimum of grade 8 education, be ambitious, and be in good physical condition. Aptitude tests are available for applicants who need advice on their ability to succeed on the program.

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
WELD 130	Oxy-Acetylene Welding, Brazing and Cutting/Theory and Practice	5	9
WELD 131	Electric Arc Welding/ Theory and Practice	9	16
DR 147	Blueprint Reading	2	3
ENG 141	Language and Communication	2	2
		18	30

Welding Specialist/En53

With the continual introduction of many new types of sophisticated welding and cutting equipment, industry is becoming increasingly more complex and specialized. The man who is in constant demand by industry is one who possesses the theoretical knowledge and practical skills necessary to perform the specialized functions of welding many of the "exotic" space age metals, welding pressure vessels or piping to exacting code requirements, or fabricating complex structures from a variety of metals, working from complicated blue prints.

This program provides the opportunity for young men with a basic knowledge of welding to achieve much greater competency in the highly specialized fields of manual and semi-automatic inert gas welding, uphill and downhill welding of pipe, and metal fabrication.

This program is designed to provide the opportunity for young men to develop valuable skills, and, in addition, acquire the theoretical background necessary to prepare them to advance toward such industrial positions as process development, weld testing and inspection, quality control and design, at the technician level.
Length of Program: 1 Year
Entrance Requirements: Prospective candidates should have successfully completed a Welding and Fabricating program at a College of Applied Arts and Technology or have specialized in welding at a Secondary School and possess a Grade 12 graduation diploma.

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
WELD 100	Pipe Welding Processes	2	3
WELD 101	Tungsten Inert Gas Welding	3	4
WELD 102	Semi-Automatic and Automatic Welding Processes	3	4
WELD 103	Industrial Welding/, Applications and Shop Procedures	3	4
MET 100	Metallurgy	2	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
EL 100	Electrical Fundamentals	2	2
DR 118	Descriptive Geometry	1	2
DR 105	Technical Drawing	2	3
		24	30

Ironworker/En70

Length of Apprenticeship Term
Three periods of 2,000 hours.
Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
IRON 10	Ironwork I	7	16
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
PHYS 11	Applied Physics	1	2
DR 14	Drafting	1.5	3
WELD 11	Welding	0.5	2
WELD 21	Welding	0.5	2
		13	30

Intermediate Program

IRON 20	Ironwork II	7	16
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
PHYS 21	Applied Physics	1	2
DR 20	Drafting	1.5	3
WELD 10	Welding	0.5	2
WELD 20	Welding	0.5	2
		13	30

Advanced Program

IRON 30	Ironwork III	7	16
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
PHYS 31	Applied Physics	1	2
DR 34	Drafting	1.5	3
WELD 41	Welding	1	4
		13	30

Machinist/Apprentice/En71

Length of In-School Training Program
Basic Program: 8 weeks, conducted during the first or second apprenticeship period.
Intermediate Program: 7 weeks, conducted during the second and third apprenticeship period.
Advanced Program: 7 weeks, conducted during the third and fourth apprenticeship period.

Basic Program

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MACH 10	Machine Shop	8	20
MATH 10	Mathematics	2	4
DR 14	Blueprint Reading	2	4
ENG 10	English	1	2
		13	30

Intermediate Program

MACH 20	Machine Shop	8	20
MATH 20	Mathematics	2	4
DR 24	Blueprint Reading	2	4
ENG 20	English	1	2
		13	30

Advanced Program

MACH 30	Machine Shop	8	20
MATH 30	Mathematics	2	4
DR 40	Blueprint Reading	2	4
ENG 30	English	1	2
		13	30

Millwright Apprentice/En72

Length of Apprenticeship Term
Four periods of 2,000 hours.
Length of In-School Training Program
Basic Program: 8 weeks, conducted during the first or second apprenticeship period.
Intermediate Program: 7 weeks, conducted during the second and third apprenticeship period.
Advanced Program: 7 weeks, conducted during the third and fourth apprenticeship period.

Basic Program

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MILL 10	Millwright I	7.5	17
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
PHYS 11	Physics	0.5	1
DR 14	Blueprint Reading	1.5	3
WELD 10	Welding	0.5	2
WELD 11	Welding	0.5	2
		13	30

Intermediate Program

MILL 20	Millwright II	7.5	17
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
PHYS 21	Physics	0.5	1
DR 24	Blueprint Reading	1.5	3
WELD 20	Welding	0.5	2
WELD 21	Welding	0.5	2
		13	30

Advanced Program

MILL 30	Millwright III	7	17
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
PHYS 31	Physics	0.5	1
DR 34	Blueprint Reading	1.5	3
WELD 30	Welding	1.5	2
WELD 31			2
		13	30

Toolmaking Apprentice/En74

Length of In-School Training Program
Basic Program: 8 weeks, conducted during the first or second apprenticeship period.
Intermediate Program: 7 weeks, conducted during the second and third apprenticeship period.
Advanced Program: 7 weeks, conducted during the third and fourth apprenticeship period.

Basic Program

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MACH	11	Toolmaking	8	20
MATH	10	Mathematics	2	4
DR	14	Blueprint Reading	2	4
ENG	10	English	1	2
			13	30

Intermediate Program

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MACH	21	Toolmaking	8	20
MATH	20	Mathematics	2	4
DR	24	Blueprint Reading	2	4
ENG	20	English	1	2
			13	30

Advanced Program

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MACH	31	Toolmaking	8	20
MATH	30	Mathematics	2	4
DR	41	Blueprint Reading	2	4
ENG	30	English	1	2
			13	30

Food Technology

The George Brown College of Applied Arts and Technology

Food Technology

Food Technology Programs of Study

Food Processing Technology/F1

This course is designed to prepare students for careers in one of the many branches of the Food Processing Industry. Graduates will be thoroughly schooled in the Applied Sciences plus additional training specifically oriented to the Food Industry. Successful graduates can anticipate employment in one of the following areas:

1. Research and Development
2. Plant Sanitation.
3. Production Control (foremen)
4. Marketing
5. Operators of Complex Pieces of Equipment
6. Government Inspection, etc.

Length of Course: 3 Years
Admission Requirements: Grade 12 or acceptable equivalent with a minimum standing of 60% in Science (Physics, Biology, or Chemistry), Mathematics, and English or

First Year/Semester I

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Chemistry	5.5	7
Physics	5.5	7
Mathematics	4	4
Biology	5.5	7
Language and Literature	4	4
Food Industry	1	1
	24.5	30

First Year/Semester II

Chemistry	5.5	7
Physics	5.5	7
Mathematics	4	4
Physiology	5.5	7
Language and Literature	4	4
Food Industry	1	1
	24.5	30

Second Year/Semester I

Organic Chemistry	5.5	7
Unit Operations	6	8
Mathematics	4	4
Microbiology	6	8
Economics	3	3
Food Seminar	1	1
	25.5	31

Second Year/Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
	Organic Chemistry	5.5	7
	Unit Operations	6	8
	Statistics	3	3
	Microbiology	5	7
	Analytical Methodology	4.5	6
	Food Seminar	1	1
		25	32

Third Year/Semester I

Biochemistry	5.5	7
Food Analysis	5.5	7
Food Microbiology	5	7
Food Technology	6	8
Production and Marketing	2	2
	24	31

Third Year/Semester II

Food Chemistry	4	4
Computer Programming	3	3
Food Quality Control	4.5	6
Food Technology	6	8
Industrial Relations	2	2
Work Study	2	2
Individual Project	2	4
	23.5	29

Dietary Services Administration/F2

Successful graduates of this course will find a demand for their services in the Food Service Department at public and private institutions as assistants to Administrative and Therapeutic Dietitians or Food Service Managers.

Length of Course: 2 Years

Admission Requirements: Grade 12 of the 4 or 5 year Streams with a minimum of 60% in Science.

First Year/Semester I

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Food Service Merchandising	2	2
Food Products and Standards	5	5
Small Quantity Foods	4	8
General Orientation	1	1
Chemistry of Food and Nutrition	6	8
Mathematics	3	3
Language and Communication	3	3
	24	30

First Year/Semester II

Small Quantity Foods	5	10
General Orientation	1	1
Production Cost Control and Accounting	5	5
Human Relations	4	4
Chemistry of Food and Nutrition	6	8
Language and Communication	3	3
	24	31

Second Year/Semester I

Advanced Quantity Food Production	3	6
Food Service Operations Supervision	5	10
General Accounting for the Industry	2	2
Human Relations	2	2
Therapeutic Nutrition	8	8
Language and Communication	3	3
	23	31

Second Year/Semester II

Food Service Operations Supervision	4	8
Management of Food Operations	3	3
Food Science Lab	3	6
Therapeutic Nutrition	8	8
Basic Economics and Organization	3	3
General Accounting for the Industry	2	2
	23	30

Food Administration/F3

This course is designed to fill the growing need for men and women who are trained to administer food production on a large scale. Students are taught all aspects of food production from purchasing through to service and in addition are schooled in modern methods of management.

Successful graduates of this course may look forward to well paid positions in restaurants, institutions, and industrial catering companies at the mid-management levels.

Length of Course: 2 Years

Admission Requirements: Grade 12 or Journeyman Chef certification with 2nd class honours.

First Year/Semester I

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Food Service Merchandising	4	4
Food Products and Standards	4	4
Small Quantity Foods	4	8
General Orientation	1	1
Chemistry of Food and Nutrition	3	4
Catering and Service of Food	2	4
Mathematics	3	3
Language and Communication	3	3
	24	31

First Year/Semester II

Small Quantity Foods	4	8
General Orientation	2	2
Production Cost Control and Accounting	5	5
Human Relations	4	4
Chemistry of Food and Nutrition	3	3
Catering and Service of Food	3	6
Language and Communication	3	3
	24	31

Second Year/Semester I

Catering and Service of Food	2	4
Advanced Quantity Food Production	3	6
Food Service Operations Supervision	5	10
General Accounting for the Industry	2	2
Human Relations	2	2
Basic Economics and Industrial Organization	4	4
Language and Communication	3	3
	21	31

Second Year/Semester II

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Food Service Operations Supervision	6	12
General Accounting for the Industry	4	4
Management of Food Operations	6	6
Food Science	3	6
Basic Economics and Industrial Organization	3	3
	22	31

Hotel Motel Administration/F4

The growing hotel and motel industry offers a variety of equally interesting career opportunities. Many, possibly the majority, of the jobs in the industry involve almost constant contact with the public, and require the sort of personality who can readily adapt to the often demanding situations which may arise. However, there are opportunities as well for the person with an analytical bend of mind.

The course delves into all aspects of hotel and motel management, and thus permits the student to become acquainted with the hotel and motel field as a whole, so that he can, upon graduation, decide in which particular area he wants to specialise. Graduates of the course will be able to find employment in the front office, sales, catering, beverage, accounting, personnel, and other departments of hotels and motels, as well as in related areas such as the institutional and restaurant catering field.

Length of Course: 2 Years

Admission Requirements: Grade 12

First Year/Semester I

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
General Orientation	2	2
Small Quantity Foods	3	6
Catering and Service	3	6
Food Products and Standards	4	4
Food Service Merchandising	4	4
Applied Chemistry of Food and Nutrition	3	3
Mathematics	3	3
Language and Communication	3	3
	25	31

First Year/Semester II

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
General Orientation	2	2
Food Production and Supervision	6	12
Food Products and Standards	4	4
Production Cost Control	3	4
Chemistry of Food and Nutrition	3	4
Human Relations	2	2
Language and Communication	3	3
	23	31

Second Year/Semester I

Beverage Operations and Supervision	3	6
Front Office Procedures	6	6
Facilities Design	5	5
Management and Training Techniques	4	4
Maintenance and Engineering	4	4
Accounting for the Industry	4	4
Economics	2	2
	26	31

Second Year/Semester II

Personnel Administration	2	2
Front Office Procedures	4	4
Hotel and Restaurant Sales Promotion	4	4
Maintenance and Engineering	4	4
Accounting for the Industry	4	4
The Convenience Concept	2	2
Facilities Design	3	6
Economics and Industrial Organization	2	2
Innkeeping Law and Business Finance	2	2
	27	30

Bakery Production Techniques/F40

This course is designed to give students a broad knowledge of the baking industry, supplying them with the knowledge and skills which will enable graduates to become commercial bakers in small bakeries, in-store bakeries and institutions, as well as many positions in plant bakeries.

Length of Course: 1 Year

Admission Requirements: Grade 10 or acceptable equivalent

Semester I

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Breadmaking Theory	3	3
Practice	3	6
Cake Making and Pastry Goods Theory	3	3
Practice	3	6
Raw Materials and Applied Science	3	3
Sanitation and Hygiene	2	2
Decorating Theory	2	2
Practice	1.5	3
English	1	1
Mathematics	1	1
	22.5	30

Semester II

Breadmaking Theory	3	3
Practice and Test Baking	3	6
Cakemaking Theory	3	3
Practice and Test Baking	3	6
Raw Materials and Applied Science	3	3
Sanitation and Hygiene	2	2
Bakery Management	2	2
Bakery Equipment	2	2
Project and Field Trips	2	3
	23	30

During the first semester students will be expected to start work on a project in the area in which they intend to specialise, under the guidance of the instructors.

Due to the complexity of the baking industry, only basic studies can be covered; an additional year of bakery technology will be offered to allow successful graduates of the Bakery Techniques course a greater degree of specialisation so that they are suited to supervisory positions, quality control, or research and development positions after a period of industrial experience.

Bakery Short Courses/F41

Short courses in specialist bakery subjects will be offered during the College year. These courses are designed to give a greater depth of knowledge to the specialist in the industry, and to those, with a broad knowledge of the industry who need specialist knowledge in order to be eligible to positions of greater responsibility.

Due to the concentrated nature of these courses, the accent will be on the theoretical side. Practical application will be given, at all stages.

Prerequisite: A minimum of Grade 10 is recommended for all these courses, but a lower grade will be accepted in special circumstances.

These courses will be 4-6 weeks Full-Time, or 14 weeks Part-Time or Evening, giving a total of not less than 120 hours.

It should be noted that these courses can only be offered if there is sufficient interest.

A. Breadmaking Technology (Sept. to Mid-October)

The baking industry; science in baking; mathematics applied to costing; materials (composition, usage, types and availability, storage and purchasing, raw materials testing.) Basic equipment: Basic sanitation and hygiene; production methods; formula balance; scoring; flow-line equipment; new production techniques; refrigeration; basic microbiology; basic accounting; packaging; advertising; merchandising; acts and regulations relevant to the baking industry.

B. Cakemaking Technology (Mid-October to December)

The baking industry; science in baking; mathematics applied to costing; materials composition, usage, types and availability, storage and purchasing, raw materials testing: Basic sanitation and hygiene; basic equipment; production methods; formula balance; scoring; flow-line equipment; new production techniques; refrigeration; basic microbiology; basic accounting; packaging; advertising; merchandising; acts and regulations relevant to the baking industry.

C. Cookie and Biscuit Technology (January to Mid-Feb.)

The baking industry; science in baking; mathematics applied to costing: Materials; basic sanitation and hygiene; basic equipment; production methods; formula balance; flow-line equipment; refrigeration; basic accounting; packaging; advertising; merchandising; acts—relevant to baking industry.

D. Candy and Chocolate Technology (Mid-Feb. to April)

The candy and chocolate industry; science in the industry; mathematics applied to costing; materials; basic sanitation and hygiene, basic equipment; production methods; formula balance; flow-line equipment; refrigeration; basic accounting; packaging; advertising; merchandising; acts—relevant to the industry.

E. Decorating Techniques and Design (April)

Background and history; science in decorating; mathematics applied to costing; materials; basic sanitation and hygiene; basic equipment; production methods; flow-line equipment; refrigeration; basic accounting; packaging merchandising; acts—relevant to industry; design and layout; lettering and basic heraldry.

F. Sanitation and Hygiene (May either full-time or offered as evening course)

Types of organisms; food spoilage; bacterial growth; food poisoning; food borne organisms; methods of control; regulations; principles of hygiene; cleansing materials and methods.

Other Courses Under Consideration

Quality Control and Product Development
Bakery Engineering
Cereal Chemistry and Technology
Bakery Management (Pre-Requisite for this course will include completion of any two other courses.)

Short Courses and Seminars

During the months September to November inclusive and January to June inclusive, short courses and seminars, of half a day to one week in length, will be offered in the following areas.

Small Retail Bakery Management:
Management Techniques/Costing/Purchasing/Display/Advertising Methods/Choosing a Location/Quality Control

Allied Trades;
The bakery "Family-Tree", Departmental Functions and Responsibilities/Bakery Purchasing Methods/Bakery Terminology/Production Methods/Packaging

For Supervisor and Foremen:
Directing Personnel/Women—Their Worth in Industry/Scheduling/Work Study/Organisation and Methods/Preventive Maintenance

Bakery Executives:
1 Day Seminar Covering the Following Subjects:
Food and Drug Regulations/Advertising/Public Relations/Organization and Methods/Administration/Training/Taxation/Corporation Law

Sunday Seminars

Food and Drug Regulations:
How do they affect the baker?

Sanitation Standards

Packaging:
Materials, Methods, Equipment

As new developments, ideas and techniques are established, it is the intention of the college to hold a short seminar on the subject. All will be advertised as they become available.

Chef Training (Pre-Employment)/F42

Graduates of this course will find unlimited opportunities for gainful employment in all areas of the Food Service Industry including Hotel Kitchens, Restaurants, Institutions, Commercial and Industrial Catering organizations.
Length of Course: 40 Weeks
Admission requirements: Grade 10

Semester I

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Theory of Food	6	6
Theory of Baking	1	1
Theory of Meat	1	1
Kitchen Management	4	4
Basic Quantity Foods	6	12
Practical Baking	1.5	3
Meat Cutting	0.5	1
Mathematics	2	2
English	1	1
	23	31

Semester II

Theory of Food	5	5
Theory of Baking	1	1
Kitchen Management	4	4
Advanced Quantity Foods	7.5	15
Advanced Baking	1.5	3
Meat Cutting	0.5	1
Mathematics	1	1
English	1	1
	21.5	31

Evening banquets are considered an essential part of this program. Candidates must be prepared to complete a minimum of 30 banquet hours during the program.

Cook Training (Pre-Apprenticeship)/F43

This course is designed to prepare men and women for a career in professional cooking. Graduates are encouraged to enter the Apprentice Chef Training program and complete the requirements for the Provincial Certificate of Qualification as a Journeyman Chef.
Length of Course: 20 Weeks
Admission Requirements: Grade 10 or Equivalent

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Theory of Food	6	6
Theory of Baking	1	1
Theory of Meat	1	1
Kitchen Management	4	4
Basic Quantity Foods	6	12
Practical Baking	1.5	3
Practical Meat Cutting	0.5	1
Mathematics	2	2
English	1	1
	23	31

Evening banquets are considered an essential part of the program. Candidates must be prepared to complete a minimum of 30 banquet hours during the program.

Dining Room Service/F44

Graduates have ample opportunity to select positions from a variety of establishments in the Food Service Industry. Many hotel dining rooms, clubs, railway dining cars, and motels employ only trained personnel or graduates of recognized courses.
Many graduates have entered the industry directly as junior managers with restaurant chains. Others find employment in institutions which permit advancement to the positions of captain, maitre d'hotel, assistant manager, manager, hostess or manageress.

Length of Course: 10 Weeks
Courses are started at one week intervals commencing in September each year. Prospective candidates are advised to contact the Registrar's Office for the exact starting date.

Admission Requirements: Grade 10 Preference
a) The Grade 10 prerequisite is waived for this course. Prospective candidates should be well-motivated, have a pleasing personality and a good personal appearance.
b) Evening banquet service is considered an essential part of the practical training program. Candidates must be prepared to complete a minimum of 30 banquet hours during the program.

Course Content	*Cr. Units per Session*	*Hrs. per Week*
Theory of Dining Room Service	2.5	5
Table Service	5	15
Theory of Food	3	6
French Service	0.5	2
Beverage Service	0.5	2
	11.5	30

Retail Meat Cutting/Butchery/F45

Professional meat cutters are employed by the following organisations; independent meat stores, chain store meat departments, hotel and restaurant portion control supply houses, home freezer supply houses and catering organizations. Graduates of this course, because of their skill and immediate value to an employer, will experience little difficulty in finding an employer of their choice.

Length of Course: 1 Semester
The first course will begin September, 1969 and the first Monday of each month thereafter. Prospective candidates for the second semester are advised to contact the Registrar's Office for exact starting dates.

Admission Requirements: Grade 10
a) Ontario Department of Education Statement of Standing awarded after successful completion of Grade 10 of any four year program.
b) A combination of education and experience considered equivalent by the Registrar.
c) Prospective candidates must have a high standard of personal hygiene and be willing to take a complete medical examination which is administered by the Health Centre at the College.

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Practical Cutting	7.5	15
Trade Theory	6	6
Business Procedures	2	2
Sanitation and Hygiene	2	2
Foods and Nutrition	2	2
Mathematics	2	2
English	1	1
	22.5	30

Baking/F 70

Length of Apprenticeship Term
Two periods of 2000 hours each.
Length of In-School Training Program
Basic Course: 15 weeks, at the beginning at the Apprenticeship term.
Advanced Course: 15 weeks conducted prior to the completion of the Apprenticeship term.

Basic

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Theory of Baking	6	6
Related Theory	3	3
Practical Baking	9	18
Mathematics	2	2
English	1	1
	21	30

Advanced

Theory of Baking	6	6
Related Theory	3	3
Practical Baking	9	18
Mathematics	2	2
English	1	1
	21	30

Chef Training (Apprentice)/F71

Length of Apprenticeship
Three periods of 2000 hours.
Length of In-School Training Program
Basic Course: 15 weeks, conducted at beginning of the apprenticeship term.
Advanced Course: 15 weeks, conducted prior to the completion of the apprenticeship term.

Note: Evening banquets are considered as essential part of this course. All students will be expected to complete a minimum of 30 banquet hours per semester.

Basic

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Theory of Food	6	6
Theory of Baking	1	1
Theory of Meat	1	1
Kitchen Management	4	4
Basic Quantity Foods	6	12
Practical Meat Cutting	0.5	1
Practical Baking	1.5	3
Mathematics	2	2
English	1	1
	23	31

Advanced

Theory of Food	5	5
Theory of Baking	1	1
Kitchen Management	4	4
Advanced Quantity Foods	7.5	15
Advanced Baking	1.5	3
Meat Cutting	0.5	1
Mathematics	1	1
English	1	1
	21.5	31

Retail Meat Cutting and Butchery (Apprentice)/F72

Length of Apprenticeship Term
Two periods of 2000 hours.
Length of In-School Training Program
One 15 week course at the beginning of the Apprenticeship term.

Course Content	*Cr. Units per Semester*	*Hrs. per Week*
Practical Meat Cutting	7.5	15
Trade Theory	6	6
Business Procedures	2	2
Sanitation and Hygiene	2	2
Cooking and Nutrition	2	2
Mathematics	2	2
English	1	1
	22.5	30

Graphic Arts

The George Brown College of Applied Arts and Technology

CONTINUING EDUCATION CONTINUING EDUCATION CONTINUING EDUCATION

Graphic Arts Programs of Study

Graphic Arts/G1

The Graphic Arts industry plays an important role in the economy of the Province of Ontario and the City of Toronto in particular. It is experiencing continuous growth. Within the College environment, the instruction, equipment and facilities provided enable students to achieve up-to-date proficiency in all phases of operation. Those who enter the printing profession from these programs will be versatile enough to meet the challenge of technological change in the next decade.

The Graphic Arts Division of the College also offers shorter technical programs and refresher courses. In addition to the regular programs, some of these special courses will be developed for special segments of the industry, on either a full-time or a part-time basis, as particular needs are explored.

Length of Course: 3 Years
Admission Requirements: Grade 12, or Grade 10 with success in High School Printing courses or Industrial experience

Persons seeking admission will produce a medical certificate indicating any physical disability.

First Year/Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
GR 100	Layout, Design, Typography and Hand Composition	2.5	4
GR 105	Reproduction Photography	3.5	5
GR 110	Printing Surface Preparation	2.5	4
GR 115	Machine Printing (letterpress and offset)	4	6
GR 120	Quality Control (testing of materials)	2	3
PHYS 100	Applied Physics	2	2
MATH 100	Mathematics	4	4
ENG 100	English	2	2
		22.5	30

Semester II

GR 102	Linotype–Intertype Keyboard Operation	2.5	4
GR 107	Reproduction–Photography (making black & white halftones)	3.5	5
GR 112	Pasteup and Film Imposition	2	3
GR 117	Machine Printing (offset)	3.5	5
GR 122	Quality Control Instruments	1.5	2
GR 125	Binding and Job Planning	2	3
CHEM 110	Chemistry	2	2
MATH 100	Mathematics	4	4
ENG 100	English	2	2
		23	30

Second Year/Semester I

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
GR	200	Monotype Composition	2.5	4
GR	205	Reproduction Photography (color separation)	2.5	4
GR	210	Film Imposition and Stripping	2	3
GR	215	Machine Printing (offset)	3.5	5
GR	220	Quality Control Procedures in Color Separation and Press Operation	1.5	2
GR	225	Binding and Finishing	2.5	4
MATH	200	Mathematics	4	4
ELTC	214	Electronics (part of ELTC 131)	1.5	2
PHYS	200	Physics	2	2
			22	30

Semester II

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
GR	202	Photo Composition	2.5	4
GR	207	Reproduction Photography (color and tone correction)	2.5	4
GR	212	Etching Flat Copper-Plate (using carbon-tissue or Roto film for gravure)	2	3
GR	217	Machine Printing (gravure flat bed and flexographic press operation)	3.5	5
GR	222	Quality Control Procedures (as applied in binding and carton making as well as "set-up" requirements of printing and binding equipment)	1.5	2
GR	228	Carton-Making and Finishing	2.5	4
MATH	200	Mathematics	4	4
ELTC	214	Electronics (part of ELTC 131)	1.5	2
CHEM	210	Chemistry	2	2
			22	30

Third Year/Technical Option:
Specialisation – in one of the following:
Type Composition (hot and cold)
Color Reproduction and Stripping Procedures
Printing-Surface Preparation and Pressmanship.
Binding and Finishing
Quality Control and Statistics.

In addition, related studies in one or more of the following: Humanities (including studies of Trade Union Movement, Industrial Psycology, and Personnel Relations); Science; Electronics. Methods of study in the final year will encourage individual work, using various approaches, including writing a thesis.

Screen Printing/G40

Screen Printing is one of the fastest growing segments of graphic arts. In many cases it is more practical to Screen Print than to use a lithographic reproduction.

Mechanized Screen Printing has grown rapidly in the past decade due to the fact that the Screen Printing process is very versatile and the equipment is not as complex to operate as rotogravure, offset or letterpress. The introduction of fast drying ink formulations and improved drying equipment, enables a small screen printer to realize ten times more profit for a short run compared with letterpress or offset.

Screen Printing offers excellent opportunities for employment in the field of printed circuits and printed advertising in the Province of Ontario. This industry is growing fairly rapidly and there is considerable demand for people who are versed in the various phases of this method of printing.

Length of Course: 1 Year
Admission Requirements:
a) Ontario Department of Education statement of standing awarded after successful completion of Grade 10 of any Four Year Program.
b) A combination of education and experience considered equivalent by the Registrar.

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
SP	130	Screen Printing	14.5	23
MATH	134	Mathematics	3	3
ENG	130	Language and Communication	2	2
PHYS	134	Applied Science	2	2
			21.5	30

Signwriting/Commercial/G41

Many large department stores, manufacturing companies, advertising agencies, and retail outlets maintain a staff of signwriters to produce new signs, posters and advertising displays. Although the competition in this vocation is vigorous, there is ample opportunity for those who show creative ability and commercial effectiveness in their work.

Students are introduced to some of the basic operations of screen process printing to indicate its relationship within the regular commercial sign shop. In addition, those who wish to start their own business will find many possibilities.

Length of Course: 1 Year
Admission Requirements:
a) Ontario Department of Education Statement of Standing awarded after successful completion of Grade 10 of any four-year program.
b) A combination of education and experience considered equivalent by the Registrar.

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
SIGN	130	Basic Signwriting and Introduction to Screen Process Printing	14.5	23
MATH	134	Mathematics	3	3
ENG	130	Language and Communication	2	2
PHYS	134	Applied Science	2	2
			21.5	30

Marine Technology

The George Brown College
of Applied Arts and Technology

Marine Technology Programs of Study

Marine Engineering/M1

This course is designed to prepare young men for careers at sea as engineer officers or for shore positions of a similar nature. The course is organized with the cooperation of shipyards, shipowners, equipment manufacturers, and the Federal Department of Transport. During the three years of training, each student will receive formal instruction in school from highly qualified marine engineers and will gain practical experience in dockyards or in machine shops of shipyards, engine manufacturing, or marine equipment manufacturing companies. The Engineer Cadet will receive a remuneration of approximately $250.00 per month while training at shipyards or machine shops. While working in shipyards or machine shops, students will continue to be under the jurisdiction of the school and will be required to complete written assignments.

Successful graduates are guaranteed employment as Junior Engineer Officers on ships of the companies who sponsor this program. Field trips are arranged during the school period to familiarize cadets with procedures in machine shops and ships.

At the end of the three year program students may write the examinations of the Federal Department of Transport for a Fourth Class combined certificate.

Graduates of the three year program will be eligible to receive exemption from Part "A" of the Federal Department of Transport examinations for Second Class and First Class certificates.

Three Year Program: (Six semesters plus 12 months of supervised experience).

Four Year Program: (*Six semesters plus 24 months of supervised experience.*)
Admission Requirements: Grade 12

Semester I

Course Designation		*Course Content*	*Cr. Units per Semester*
EN	103	Applied Heat	1
EN	105	Applied Mechanics	1
EN	109	Metallurgy	2
DR	157	Drafting	2
EL	121	Electricity	1
MACH	124	Machine Shop	2
MAR	111	Ship Construction	1
MATH	103	Mathematics	1
CHEM	121	Chemistry	1
ENG	103	English	1
			13

Semester II

Course Designation	Course Content	Cr. Units per Semester
EN 110	Metallurgy	1
EN 101	Engineering Practice	2
EN 104	Applied Heat	1
EN 106	Applied Mechanics	2
DR 114	Drafting	2
EL 122	Electricity	1
MACH 125	Machine Shop	2
MATH 104	Mathematics	1
CHEM 122	Chemistry	1
		13

Semester III

EN 201	Engineering Practice	2
EN 203	Thermodynamics	2
EN 205	Applied Mechanics	1
EN 207	Strength of Materials	1
MAR 110	Ship's Business	1
DR 223	Drafting	1
EL 221	Electricity	1
MACH 221	Machine Shop	2
MATH 203	Mathematics	1
		12

Semester IV

EN 202	Engineering Practice	2
EN 204	Thermodynamics	2
EN 206	Applied Mechanics	1
EN 210	Mechanics of Fluids	1
EN 208	Strength of Materials	1
DR 224	Drafting	1
EL 222	Electrotechnology	1
MACH 222	Machine Shop	2
MATH 204	Mathematics	1
		12

Semester V

EN 301	Engineering Practice	2
EN 303	Thermodynamics	2
EN 305	Theory of Machines	2
EN 311	Naval Architecture	1
EN 313	Strength of Materials	1
EN 307	Mechanics of Fluids	1
EL 321	Electrotechnology	1
WELD 321	Welding	2
MATH 303	Mathematics	1
		13

Semester VI

Course Designation	Course Content	Cr. Units per Semester
EN 302	Engineering Practice	2
EN 304	Thermodynamics	2
EN 309	Strength of Materials	1
EN 306	Theory of Machines	2
EN 308	Mechanics of Fluids	2
EN 312	Naval Architecture	1
EL 322	Electrotechnology	1
MATH 304	Mathematics	1
		12

Navigation Officer Cadet/M2

This course is organized with the advice and co-operation of Shipping Companies and the Federal Department of Transport to prepare young men for careers at sea as deck officers in the Canadian Merchant Marine. Students will receive formal instruction at the College from highly qualified mariners and will also gain practical experience on board ships of the merchant fleet during the three and a half years' training period. This period is divided into twenty-four months at school and eighteen months seagoing experience.

While undergoing their sea training cadets may expect to receive a nominal remuneration of approximately $250.00 per month and free board and lodgings while on shipboard. The shipping companies who sponsor this program will offer employment to successful candidates as junior navigating officers.

It should be noted that the Federal Department of Transport conducts examinations for, and issues Certificates of Competency in, the various deck officer grades. It will be possible for cadets to write the Second Mate Foreign-Going Certificate, and in addition, First Mate's Home Trade Certificate at the end of the three and a half years of training, provided that the sea service is approved.
Length of Course: 3½ Years
Admission Requirements: Grade 12
Period of Time at School: October 1 – March 31
Period of Time at Sea: April 1 – September 30
Note: All applications for this course must be accompanied by a Department of Transport Certificate attesting to a minimum vision of 20/20 and to normal colour perception.

First Year

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
MAR 100	Ship Knowledge	6	8
MAR 101	Magnetism	1	2
MAR 102	Chart Projection	4	4
MATH 102	Mathematics	4	4
DR 117	Drawing	1	2
MAR 105	Meteorology	2	2
PHYS 102	Physics	4	4
ENG 101	English	1	2
EL 123	Electrotechnology	3	4
		26	32

Second Year

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
MAR 200	Naval Architecture	4	4
CHEM 121	Chemistry	2	4
MAR 201	Seamanship	4	6
MAR 202	Ship's Business	1	2
MATH 202	Mathematics	4	4
MAR 203	Navigation	4	4
PHYS 201	Physics	4	4
EL 104	Electrotechnology	3	4
		26	32

Third Year

MAR 300	Naval Architecture	4	4
EL 204	Electrotechnology	3	4
MAR 301	Seamanship	4	6
MATH 302	Mathematics	4	4
MAR 308	Engineering Knowledge	1	2
MAR 303	Navigation	4	4
MAR 304	Meteorology	1	2
MAR 306	Magnetism	1	2
MAR 307	Chart Projection	4	4
		26	32

Fourth Year

MAR 404	Chart Projection	4	4
MAR 400	Naval Architecture	4	4
MAR 401	Seamanship	6	8
MATH 402	Mathematics	4	6
MAR 403	Navigation	5	6
EL 304	Electrotechnology	3	4
		26	32

Correspondence Courses/M(C)

The College offers correspondence courses dealing with the Department of Transport requirements for the various certificates of competency. Each course, which consists of 15 to 30 lessons, covers a subject area in a particular grade. They contain assignments which, upon completion, are to be sent to the College for marking.

Application forms for the courses may be obtained from the Registrar's office. The fee is $10.00 per subject and is payable by money order or cheque, to be made payable to George Brown College. Do not send cash.
The following is a list of the 25 courses available.

Marine Deck Officers

Second Mate Foreign-Going

FE1	Electronic and Other Aids to Navigation

Second Mate Home Trade

HN1	Navigation
HE1	Electronic and Other Aids to Navigation
HC1	Chartwork and Pilotage

First Mate Home Trade

HN2	Navigation
HS2(A)	Elementary Shipboard Knowledge (1)
HS2(B)	Elementary Shipboard Knowledge (2)
HE2	Electronic and Other Aids to Navigation
HC2	Chartwork and Pilotage

Second Mate Inland Waters

IC1	Chartwork and Pilotage
IE1	Electronic and Other Aids to Navigation

First Mate Inland Waters

IC2	Chartwork and Pilotage
IS2(A)	Elementary Shipboard Knowledge (1)
IS2(B)	Elementary Shipboard Knowledge (2)
IE2	Electronic and Other Aids to Navigation

Marine Engineering Officers

4th Class

4G	Engineering Knowledge General
4S	Engineering Knowledge Steam
4M	Engineering Knowledge Motor

3rd Class

3PM	Practical Mathematics
3G	Engineering Knowledge General
3M	Engineering Knowledge Motor

2nd Class

2MA	Mathematics
2AM	Applied Mechanics
2H	Heat and Heat Engines
2NA	Naval Architecture
4SE	Stationary Engineer 4th Class
3SE	Stationary Engineer 3rd Class

Marine Tutorial Courses/M(T)

Courses are offered which prepare qualified seamen for Department of Transport Certificates of Competency in all grades, as Marine Engineers or as Mates and Masters of ships in the inland and minor waters of Canada, home trade waters and foreign-going service.

The minimum age specified by Department of Transport regulations for holders of Certificates of Competency is 20 years. A qualifying period of sea service of 3 years is also required.

Opportunities for advancement are good in the Marine field as modern and larger vessels are built for the Merchant service. A Canadian Coastguard is also being formed, with new vessels for government service.

Special Marine Courses:

Navigation

Seamanship, Ship Stability and Construction, Magnetism and Magnetic Compass, Chartwork, Electronic aids to navigation: Radar, gyro-compass, echo sounder, direction finder and Decca Navigator equipment.

Marine Engineering

Mathematics applicable to Engineering Problems, Boilers, Steam and Diesel Engines, Metals, Gases, Theory of Propulsion, Drafting, Combustion in Marine Engines, and Elementary Machine Shop Practice.

Radar Simulator

This is a realistic course in which navigation situations, involving up to five targets travelling on different courses at different speeds, can be made to appear on the radar screen. It is a practical course, wherein collision situations are set up and the student is given the opportunity of handling a vessel by simulation. Anti-collision exercises afford realistic training. This is a one week course.

Radar Observer

This course covers the principles of radar, adjustment of operational controls, practical starting and stopping equipment, interpretation of the display (including topography ashore as well as conspicuous objects afloat), factors affecting echo characteristics and false echoes, detection of movement plotting both relative and true, and working examples of plots containing fixed and moving targets with speed and course alterations. This course is combined with the Radar Simulator course. The duration is one month with three weeks devoted to Radar Observer or Theory and one week devoted to Radar Simulator or Practical.

A certificate of satisfactory attendance is given on completion of the Radar Simulator course. An endorsement is obtainable on examination by the Department of Transport after completion of the Radar Observer's course.

For more detailed information contact the registrar's office.

Details of Courses

The George Brown College of Applied Arts and Technology

Details of Courses

Accounting

AC 100/Accounting
Purpose, terminology. Daily, monthly record sheets, wage and pettycash records, cheques, statements. Profit and loss sheets, expenditures. Bookkeeping: the balance sheet, classified financial statements, specified journals.
One Semester

AC 101/Accounting
Introduction to manufacturing accounts and major forms of cost accounting. Analyses of formal statements and accounting data.
One Semester

AC 102/Accounting
Tax accounting, forms of taxation. Taxation: the individual, proprietorship, the corporation. Income and deductions. Comparison of Federal and Provincial taxes.
One Semester

AC 200/Accounting
Principles of cost accounting. Inventory control and accounting. Production control payroll and labour costing. Personnel records. Sales invoicing. Analyses and records.
One Semester

AC 201/Accounting
The valuation of current assets, investments, plant and equipment, liabilities. Business net income. Presentation of financial statements, business funds, fixed and working capital. Sources of capital funds. The money market, the non-corporate enterprise, corporate capitalization, stocks and bonds.
One Semester

AC 202/Accounting
Cost accounting and control. Budgetary control, the budget as an instrument of management, types of budget, preparation of the budget, limitations. Cost control, organization and elements, cost estimating and allocation. Direct and indirect costing. Standard costs. Methods of pricing.
One Semester

AC 203/Accounting
The Audit. Role of an auditor. Auditing procedures and standards. Internal and independent auditing. Auditing techniques, the payroll, depreciation accounting, the credit department.
One Semester

Air Conditioning

AIR 100/Principles of Refrigeration
Changes of state, BTU, vapour pressure, heat transfer, absolute pressure, Boyle's and Charles' laws, absolute temperature, perfect gas equation, gas constants, Avogadro's Law, Dalton's Law, derivation of specific humidity. Heat content, partial pressure and general gas law problems related to refrigeration, refrigeration cycle, refrigerants, compressors, valve types, seals, lubrication, air and water cooled condensers, evaporative condensers, water regulating valves, metering devices with automatic and thermostatic valve operation in detail, types of evaporators, auxiliary equipment, oil separators, heat exchangers, overloads, overcurrent devices and reduced voltage starters, field trips.

AIR 101/Psychrometrics and Load Estimating
Specific humidity, vapour pressure, relative humidity, dry bulb, wet bulb cause and effect, enthalpy of air-water mixture, dew point, relation among dry bulb, wet bulb, dew point, relative humidity and enthalpy, concept of adiabatic saturation, appartus dew point, sensible heat factor, solutions of practical air conditioning problems, body comfort, orientation of building, construction materials, design conditions, solar loads, storage effect, structure, weight and daily range calculations, air films and air spaces, transmission co-efficients, ventilation and infiltration, internal loads.

AIR 102/Refrigeration Lab
Safety rules, operation and care of refrigeration hand tools, tubing tools, soldering and silver brazing, leak detectors, gauges and thermometers, refrigeration compressors, study of construction, dismantling and repair operations, testing, refrigerant flow controls (evaporator feed), installation of single and multiplex evaporator systems, test instruments, resistance and thermistor temperature bridges, types of psychrometers, dew point indicators and relative humidity indicators, ohmmeters, wheatstone bridges and meggers.

AIR 103/Air Conditioning System Design
Design and layout of air conditioning systems for homes and small buildings. Calculating heat loss and heat gain.

AIR 200/Refrigeration and Air Conditioning Lab
Packaged equipment control and trouble shooting, centrifugal chillers, electronic and pneumatic controls, use of air conditioning instruments, velometer, anemotherm dryer electric control panels, cooling and dehumidifying, pneumatic control panel heating and humidifying, motor control equipment.

AIR 201/Control Systems
Set point, control point, deviation, differential throttling range, lag, timed two-position control, proportional control, basic wheatstone bridge, voltage amplification phase shift, summer-winter compensation, pneumatic actuators, valves, sensors, day-night set back, solenoids, maximum and minimum pressures, switching relays, pressure-electric switches, master-submaster control.

AIR 202/Design of Air Conditioning Systems
Equipment selection, central station, unitary systems, air distribution, basic principles of air flow, laws, ductwork, duct systems, duct sizing, distribution in rooms, cleaning methods, air flow measurement and balancing, hot water heating, boilers, types of systems, selecting heating units, system design.

Appliance Servicing

AP 130/Laundry Equipment
Theory and operation of laundry equipment and assembly and disassembly of wringer washers, automatic washers, dryers and water heaters, fault finding and repair procedure, circuit tracing, circuitry, service analysis, customer relations.

AP 131/Kitchen Equipment
Theory and operation of kitchen equipment, assembly and disassembly of ranges, dishwashers and garbage disposal units, circuitry, fault finding, and repair procedures.

AP 132/Refrigeration
Fundamentals, compression system of refrigeration, refrigerants, liquid feed devices, evaporators, compressors,condensers, electric motor controls, defrosting methods, food preservation, air conditioning, humidity in refrigeration, heat load calculations, absorption system of refrigeration, use and care of refrigeration tools and equipment, making refrigeration joints, aluminum welding, evacuating, charging, leak testing. Dismantling and assembling refrigerators and air conditioners, rework of hermetic compressors, adjustments, maintenance service analysis, repair of refrigerators, air conditioners, ice makers.

AP 133/Gas Appliances
Compliance with the gas code regulations, heat content of gases, operating principles and testing safety controls, service analysis of water heaters, ranges and dryers.

Architecture

ARCH 100/Materials and Methods
The manufacture and use of cement, steel, brick and clay tile, plywood and timber, lime and gypsum, glass, plastic laminates, cast iron, malleable iron, copper, insulations, roofing materials, concrete design and control of mix, building construction, terminology and techniques.

ARCH 200/Materials and Methods
Practical application of building materials as used in the architectural building trades by lecture and application: contents specification, BCI (Builders Construction Index), filing system.

ARCH 201/History of Architecture
A review of the historical background of architecture from primitive man to the contemporary, with emphasis on Egyptian, Byzantine, Greek, Roman, Gothic and the Renaissance. Field trips to Royal Ontario Museum and local architectural examples.

Baking

Baking I
Introduction to baking, sanitation and hygiene, safety, tools and equipment, storage, refrigeration and freezing, theory of baking, trade terminology, commodities, theory of basic ingredients, flour, sugar, fat, eggs, milk, salt, chocolate, nuts, leavening and thickening agents, jams and spreads, flavours and colours, practical training in the bakery and in the foods lab, preparation of basic products such as biscuits, muffins, bread and rolls, sweet yeast and Danish doughs, pies and tarts, fillings and icings, pastries, cookies and cakes.

Baking II
New materials, ready-made mixes, time saving techniques, fermentation and retarding of yeast doughs, freezing procedures, quality control, costing, wrapping and storing of baked goods, preparation of special bakery products in the lab, French pastries, petit fours, creams and icings, chocolate and marzipan work, decoration of cakes for various occasions, gum paste, techniques of decorating dummies for display purposes and showpieces.

Barbering

BAR 10/Theory
Sanitary science; use of germicides, use of antiseptics, personal hygiene, shop hygiene. Basic knowledge; manufacture, use of parts, proper manipulation of combs, clippers and shears, kinds, temper, sizes, safety factors of razors, manufacture, quality, proper use of hones and strops. Basic theory; cells, digestion, circulation, bones of the head, muscles, nervous system, skin, shedding, regrowth of hair, light therapy, hair, scalp and skin ailments, theory of massage.

BAR 11/Practical Knowledge
Haircutting: Shape of heads, texture of hair, styling. Shaving: Texture of skin, texture of whisker, preparation, stroking of razor. Facials: Application of creams, manipulations. Shampooing: Suitable solvent for different scalp conditions, scalp treatments, recognition of diseases, application of high frequency current. Shop Management: Regulations governing shop ownership, location, simple bookkeeping, equipment, supplies. Professional Ethics: Developing personality, tolerance, understanding and respect for competitors, maintaining harmony among shop personnel.

Business and Commerce

BC 100/Principles of Advertising
An orientation course looking at advertising from the marketing, communications and consumer viewpoints. Stress is placed on: What advertising is, the position of advertising in our society, the psychology behind advertising. Advertising as it exists in the framework of both marketing and communications. A comprehensive study of the various types of media.

BC 105/Marketing
Major marketing functions, research, sales planning, advertising and promotion, inquiries and orders servicing channels of distribution. Marketing Organisation.
One Semester

BC 110/Business Law
A summary of our laws of contract, employment, agency, sale of goods. Insurance, bailments, real estate, negotiable instruments, partnerships. Corporation: bankruptcy, trade marks, business crimes and tests. Patents.
One Semester

BC 200/Advertising
Principles of planning and management. Advertising research and planning: what, when, where, and how?
One Semester

BC 201/Advertising and Sales Promotion
Types of advertising, advertising media, standards. The 'Agency'. The advertising department, functions, co-ordination, sales promotion, methods of effecting selling. Organization of the advertising and sales-promotion departments. Case studies.
One Semester

BC 205/Marketing
A case study approach to the institutions and channels of marketing. Study of the marketing process, research and product promotion. Analysis of pricing and control.
One Semester

Business Machines

BM 100/Typewriters
The various makes and models of typewriters available and their basic differences, the principle operation of each machine, corrections, major type, styles and pitches, assembling and adjusting of the keyboard and impression control, carriage, escapement, universal mechanism, ribbon drive, bichrome mechanism, tabulator mechanism, comparison between standard and electric machines, repeat and non-repeat power aims, carriage return mechanism, power driven feature keys.

BM 101/Figuring Machines
Introduction to the basic principles and construction of adding machines, how an adding machine adds, various operations performed on adding machines, operating methods, manual and power operated, advantages and disadvantages of each, types of machines, ten key and full keyboard, advantages and disadvantages of each, methods of printing, disassemble, study and assemble individual units, keyboard, printer, accumulator, accumulator rack, mainshaft drive, motor and power transmission, machine adjustments, trouble shooting, tape reading, customer relations.

BM 102/Photo-Copy Machines
Theory of photo copy machines, disassembling and assembling, checking, trouble shooting, repairing, adjusting and replacing parts, safety precautions, customer relations.

Carpentry

CAR 10/Carpentry I
Tools and their maintenance, preparation of materials; timber, growth, structure, recognition, conversion, seasoning, grading, defects, application; joints, classification, layout and application; fastening, power and hand nails, screws, accessories; adhesives, types, composition, manufacture, preparation, application; abrasives, types, manufacture, hand, portable and machine sanding. Shop and bench procedures, lay-out rod or board, detailing, order for milling, assembly methods; doors, sizes, types, construction, hanging; jambs, types, dimensions, erection; general hardware and application; intersection of mouldings, sections, use of mitre box, application; framing square, description, principles, markings, application; arches, centres, power tools, applied shop projects, safety, practical geometry.

CAR 20/Carpentry II
General construction, wall plates, floor construction, wall framing, insulation, roof framing, exterior trim and finishes; window frames, frame and masonry, trim around frames; sash, stock sizes, types, construction, order and fitting; inside partition, wall and ceiling treatments, floor coverings, use of level, power tools; applied shop projects, safety, practical geometry.

CAR 30/Carpentry III
Building permits, by-laws, building codes, general survey and registration of lands, soil condition, site-layout. Residential and commercial, use of transit. Excavations, drainage. Concrete practices, footings and foundation, columns, beams, sills, floors, form work, and application. Stair building, power tools, applied projects, safety, practical geometry.

Chef Training

Chef Training I
Theory of Food: sanitation and hygiene, safety, equipment, refrigeration, basic cooking methods, basic nutrition, culinary terminology. Kitchen Practice and Foods Laboratory. Main Kitchen: basic flavouring, herbs and spices, basic stocks and sauces, soups, eggs, pasta and rice dishes, basic preparation of meat, poultry and fish, garnishes, potato and vegetable cookery. Larder: butchering, vegetable preparation, salads, dressing. Bakery: basic principles in baking, quick breads, yeast leavened doughs, pies, tarts, cookies, puddings, jello, cakes, banquet preparation and service.

Chef Training II
Theory of Food: purchasing, menu planning, culinary terminology, receiving, storage and issuing, portion control and costing, logic of cookery. Kitchen Practice and Food Laboratory. Main Kitchen: culinary basics, derivatives of basic sauces, consomme, bisques, cold soups, fish and seafood, game cookery, meat and poultry, garnishes, derivatives of sauce mayonnaise, marinades, froid sauces, farces and mousse. Bakery: basic preparation in the patisserie, basic pastes, cakes, souffles, steamed and baked pudding, ices, petit fours, fresh fruit dessert, cake decorations, banquet preparation and service.

Chemistry

CHEM 100/Chemistry
Semester I: Introduction to Chemistry. Physical and chemical changes. Kinetic theory, atomic theory, valences, compounds, formulae, equations, nomenclature; chemical reactions, the structure of the atom; the periodic table, chemical bonds and structure of molecules, solids, liquids, and solutions.
Semester II: Rates of reactions and chemical equilibrium. Fundamental laws of Chemistry, solubility equilibria. Acids and bases, neutralization, pH problems, oxidation and reduction. Elementary electrochemical and nuclear chemistry. Introductory organic chemistry. Associated laboratory experiments.

CHEM 107/Chemistry
Introduction to chemistry. Physical and chemical changes. Kinetic theory, atomic theory, valences, compounds, formulae, equations, nomenclature, chemical reactions, the structure of the atom; the periodic table, chemical bonds and structure of molecules; solids, liquids and solutions. Rate of reaction and chemical equilibrium, fundamental laws of chemistry, solubility equilibria. Acids and bases, neutralization, pH problems. Water hardness. Introductory organic chemistry.

CHEM 110/Chemistry
Semester I: Introduction to chemistry. Physical and chemical changes. Kinetic theory, atomic theory, valences, compounds, formulae, equations, nomenclature, chemical reactions, the structure of the atom; the periodic table, chemical bonds and the structure of molecules; solids, liquids and solutions. Rates of chemical reactions; equilibrium in chemical reactions, solubility equilibria; acids and bases; neutralization, pH problems, oxidation and reduction, galvanic corrosion, water hardness.
Semester II: Fundamental laws of chemistry. Introduction to organic chemistry; the structure of organic molecules; alkanes, alkynes, alcohols, carboxylic acids; acid halides and anhydrides, ethers, esters, aldehydes, ketones, amines, aromatic and aliphatic compounds, amino acids, proteins. Introduction to polymer chemistry. Associated laboratory experiments.

CHEM 121/Chemistry
Introduction to chemistry. Physical and chemical changes; kinetic theory, atomic theory, valences, compounds, formulae, equations, nomenclature; chemical reactions, the structure of the atom; the periodic table; chemical bonds and the structure of molecules; solids, liquids, and solutions. Rate of reaction, and chemical equilibrium. Fundamental laws of chemistry. Associated laboratory experiments.

CHEM 122/Chemistry
Introduction and classification of matter, properties of gases, atomic theory, chemical formulae and equations, atomic and molecular structure, chemical terminology, periodic table, properties of liquids and solids, solutions, rate of reaction, chemical equilibrium, ionic theory and electrolysis. Acids, corrosion and protection of metals, calculations and problems. Safety in handling chemicals, flammable and combustible liquids, incompatibility of chemical compounds, oil fire protection, gas hazards, entry into closed spaces, respiratory protective equipment, safe handling and stowage practices.

CHEM 135/Chemistry
Introduction to chemistry. Physical and chemical changes. Kinetic theory; valences, compounds, formulae, equations, nomenclature. Chemical reactions, the structure of the atom, chemical bonds.

CHEM 207/Chemistry
Semester I: The structure of organic molecules, alkanes, alkenes, alkynes, alcohols, carboxylic acids, acid halides and anhydrides, ethers, esters, aldehydes, ketones, amines, aromatic and aliphatic compounds, amino acids, proteins.
Semester II: Basic concepts. Molecular forces and chemical bonding, functionality, molecular weight and its distribution, configurations and conformations, morphology. Chemistry of synthetic resins; types of resins, rubber impression materials. Physical and mechanical properties of dental materials; denture base resins, degradation of polymers, gypsum products.

CHEM 210/Chemistry/Polymer
Semester I: Basic concepts of polymer science. Molecular forces and chemical bonding, functionality, molecular weight and its distribution, configurations and conformations, morphology, addition and condensation, polymerization, copolymerization. Methods for determining molecular weights of polymers. Polymerization techniques.
Semester II: Natural organic and inorganic polymers. Degradation of polymers. Properties of polymers. Rheological properties and processing of polymers. Instruments for measuring rheological properties. Newtonian and non-Newtonian fluids. Types of flow. Polymer solutions and dispersions. Solid and molten polymers. Application of polymers. Associated laboratory experiments.

Child Care

CHI 160/CHI 260/Field Practice
Every student undergoes continuous supervised practical training in an institutional setting. First-year students spend two days a week in their field placements. Second-year students are in their field placement three days each week. This practical experience is of central importance in preparing students for specialized work with emotionally disturbed and handicapped children. Regular supervision is given by senior staff members of the institution and by course instructors. Field practice affords the students opportunities to take part in the hour to hour care of children under the guidance of experienced staff, who interpret the behaviour and special treatment needs of the children.

CHI 161/Child Study I
The basis for understanding well children and those who are physically or emotionally disabled lies in a study of normal infant, child and adolescent growth and development. This course provides groundwork knowledge of developmental processes observed in the realms of intellectual, emotional and social maturation.

CHI 162/Health and First Aid
This course deals with promotion and maintenance of health and with prevention of disease in the individual and in the community. Human physiological processes are explored as they relate to child growth and development. Care of the unwell child is discussed, with practice in simple nursing procedures. A Standard Red Cross First Aid Course is taught, with certification after successful examination.

CHI 163/The Function of The Family
The course examines the family in Canada and cross-culturally. Special emphasis is placed on the background of the family that produces a disturbed child. The goal of the course is to understand the psychological and sociological dimensions of the family.

CHI 164/Caring for The Disturbed Child
Students are helped to arrive at a treatment philosophy. Established occasions in daily lives of disturbed children are closely examined through Bruno Bettelheim's work, "Love is not Enough," and through the written observations of the students.

CHI 165/CHI 265/Activities with Children
The course is designed to develop skills to be used when planning recreational programs for groups of children. A wide range of arts and craft media will be explored and suggestions given for their use. Each student will also be encouraged to acquire a repertoire of children's games. During the first year students will be required to participate in a swimming and water-safety program and it is necessary for all students to pass a Red Cross water safety test. At the end of the second year leadership roles and the structure and cohesion of groups are studied to give insight into the dynamics of groups.

CHI 166/Social Services
Students are introduced to the legal aspects of Child Care and protection and become familiar with provincial legislation. Theory is re-inforced by visits to agencies, institutions and hospitals in the vicinity representing health, welfare, education, and correctional services. In addition representatives from social agencies are invited to the College to talk with students and answer questions. Community services to families and children, foster home and group home care are examined in the light of contemporary needs and provision.

CHI 167/CHI 267/Psychiatric Seminar
Psychiatric Seminars are held weekly for First Year and Second Year students. These meetings provide an opportunity for students to discuss problematical situations which arise in their field work and in human relations.

CHI 260/see CHI 160

CHI 261/Child Study II
Using normal growth and development as a background, this class explores abnormal behaviour. The history of treatment for disturbed people is examined and various current treatment theories are studied. The varying degrees of emotional disturbance are closely examined.

CHI 263/The Individual in Society
Students are introduced to the sociological perspective of human behaviour in groups. Contemporary social problems are studied and related to the individual in today's technological society.

CHI 264/Therapy of Play
Characteristic forms and patterns of play throughout the years of childhood and adolescence are examined in the light of their meaning to children and to the world about them. Students are guided to observe and to understand the play of disturbed children and emphasis is laid on introducing constructive play into milieu therapy.

CHI 265/see CHI 165

CHI 266/Introductory Psychology
This course provides the theoretical framework for the study of behaviour and students become familiar with the methods of psychological research. The nature of motivation, perception and learning will be related to inherited and environmental factors. The uses of psychological testing and theories of personality development are integrated into the study of conflict and adjustment.

CHI 267/see CHI 167

Civil Engineering

CIV 100/Construction Materials and Methods
Wood, masonry, asphalt, concrete, reinforced concrete, structural steel, plan interpretations of structural drawings, foundations, footings, framing plans, schedules, details, plan study of bridges, types, materials of construction abutments, earthwork quantities, mass diagrams and identification of soil types.

CIV 200/Structures
The study of above ground installations to determine their components and method of construction; an extension of first year methods and materials with particular emphasis on plan interpretation.

CIV 201/Concrete
Reinforced concrete, concrete beams, columns, lintels, floors, walls, engineering and placing drawings, reinforcing materials, accessories, detailing practices in steel, reinforced concrete and wood.

CIV 202/Municipal Services
The collection and distribution of the community water supply. The factors influencing water runoff and disposal and the manipulation of topography and quantities to determine pipe sizes and gradients and location of sanitary and storm sewers.

CIV 203/Transportation
Population and traffic analyses as they indicate the need for transportation facilities. The location, design, and construction of urban and rural roads, including soils, surveys, materials, pavements, right-of-way requirements and maintenance.

CIV 204/Codes and Specifications
A study of building by-laws, zoning regulations, planning procedures, engineering specifications, critical path, computer applications to above.

Construction

CO 100/Building Construction
Site selection, excavation, soils and simple tests, dewatering well points, footings, grade beams, grillage foundations, piles, caissons, water-proofing, damp-proofing, concrete formwork design, construction equipment, power and hand tools, scaffolding, hoists, shores, sheeting, needling, underpinning, concrete placement, protection and finishing, field trips to study construction procedures, detailing construction elements, drawing interpretation, systems and types of construction.

CO 101/Quantity Surveying I
Use of quantities, scales, duodecimals, methods of measurement, Canadian method of measurement for building works, excavating and backfill, concrete, masonry, rough carpentry, painting, floor covering, acoustical work, plaster work, take-off and calculation of simple structures.

CO 102/Mechanical Installations I
Water, sewage disposal, store drainage, pipe sizing, traps, fall, piping materials, couplings, joints, water pressure, plumbing layout, fixtures, ventilation, sprinklers.

CO 103/Construction Materials
The manufacture and use of cement, steel, brick and clay tile, plywood, and timber, lime and gypsum, glass glazing and caulking, plastic laminates, cast iron, malleable iron, copper, insulations, roofing materials, concrete design and control of mix, practical application of quality control testing of concrete under laboratory conditions.

CO 104/Site Engineering
Use of level, transit, etc., hand levels, the level, its use, chaining, transit, use and adjustment, measuring horizontal and vertical angles, setting out buildings, offsets, curves, contours, earthwork quantities.

CO 200/Building Construction
Reinforced concrete, structural steel, laminated timber, stone, roofing and sheet metal, partitions, doors, windows, window wall, panelling, plaster and drywall, acoustics, insulation, construction equipment, construction organization; the architect, structural engineer, mechanical and electrical engineers, field trips to study construction procedures, drafting detailing construction elements outlined above.

CO 201/Quantity Surveying II
Canadian method of measurement, reinforced concrete, structural steel, advanced masonry and stone, carpentry and millwork, terrazzo and tile, analysis of prices, pricing, overhead and profit, discounts, analysis of sub-contract bids, organization of estimating department, take-off and pricing of several trades, elemental bills of quantities.

CO 202/Mechanical Installations II
Principles of heating and air conditioning, types, heat loss and gain, calculations for buildings, humidity, relative humidity, ductwork, dampers and diffusion, air pollution, electrical equipment, principles of lighting, types of fixtures and wiring, transformers, floodlighting, underfloor duct and distribution systems.

CO 203/Contracts and Specifications
Contracts, contract law, standard forms, sub-contracts, purchasing, penalties, arbitration, liens, decision of architects, engineer or owner, changes, extras and credits, sample contracts, purchase orders, change orders, specification, standard specification, tender documents, bid and performance bonds, CPM, PERT scheduling theories, methods and practical applications.

Dental Technology

DENT 100/Dental Lab I (basic)
Dentures complete: acrylic trays, master model, bite rims, articulation, setting teeth, repairs, relines, remakes. Denture partial (resin): trays, models, rims, etc. Denture partial (cast): acrylic trays, master model, bite rim, articulation, survey, design, duplicate to refractory model, fabricating plastic or wax forms to design, investing, heating, casting, finishing, polishing. Bridgework: handling impressions, dies, models, bite preparation for articulation, waxing dies for acrylic veneers, acrylic crowns, gold crowns, investing, heating, mould, casting, trimming, polishing, packing resin. Bridgework, Precision attachment: acrylic trays, dies transfer copings, assembling dies into copings, master model, adjusting bite for articulation, waxing abutments with preparation for boxing, fitting attachment in boxing and soldering, fitting and soldering completion of attachment work to partial castings. Ceramics: dies, master model, bite preparation for articulation, adapting platinum foil, building and fusing of porcelain. Metal ceramics: dies, master model bite preparation for articulation, casting gold crowns, fusing porcelain to crown. Orthodontics: master model, fitting clasps, labial and/or lingual arch, springs for movement of teeth, expansion screw. Science: a comprehensive study of physical and chemical properties of dental materials such as gypsum products, impression materials, resins, waxes, investments, metals and their alloys.

DENT 101/Dental Materials
Proper weighing, measuring and manipulating materials. Composition of dental materials. Metallurgy. Composition and properties of dental alloys such as gold, chrome and steel.

DENT 102/Dental Anatomy
Outline of anatomy of the teeth, drawings of each tooth from central incisor through the second molar. Teeth are carved completely including root portions.

DENT 103/Science of Dental Materials
Semester I: Structure of matter, physical properties of dental materials. Gypsum products: chemistry of setting, basic principles, technical considerations. Impression compound, eugenol impression pastes, hydrocolloid impression materials.
Semester II: Rubber impression materials, chemistry of the synthetic resins, metals: solidification and structure, wrought metal: deformation, strain hardening, recrystallization.

DENT 200/Dental Lab II
Similar to DENT 100 but at an intermediate level.

DENT 203/Science of Dental Materials
Semester I: Constitution of alloys, solid state reaction heat treatment, tarnish and corrosion, dental casting gold alloys, inlay casting wax, gold inlay casting procedures.
Semester II: Dental porcelain, dental gold alloy wires, gold alloy solders. Carbon steel, bobalt—chromium alloys for dental castings. Abrasion and polishing, wrought base metal alloys—soldering and welding.

DENT 300/Dental Lab III
Similar to DENT 100 but at an advanced level.

Drafting

DR 10/Drafting
Reproduction process, three view drawing, use of instruments, alphabet of lines, invisible edges, dimensioning, sections and material symbols, freehand sketching, introduction to isometric drawing.

DR 11/Descriptive Geometry
Orthographic projection, the use of reference lines, principal and auxiliary planes, projection of a point, projection of a principal, parallel, perpendicular, oblique, intersecting and skew lines. True length of oblique lines by auxiliary view method, revolution and triangulation. Point on a line, point view of a line, true distance from a point to a line, true distance between skew lines.

DR 12/Drafting and Blueprint Reading
Three view drawing, lettering, use of lines, dimensioning and layout, sections and material symbols, freehand sketching, electrical symbols and introduction to residential layouts and wiring.

DR 14/Drafting and Blueprint Reading
Conventional lines. Orthographic multiview projection. Sections and material symbols. Auxiliary views. Dimensioning. Freehand Sketching.

DR 18/Drafting
Use of instruments, geometrical shapes and construction, lettering, orthographic projection, isometric drawing, freehand sketching.

DR 20/Drafting
Plan study of frame, masonry and concrete construction regarding materials, construction members, methods of dimensioning, sections, details, schedules, and architectural standard symbols.

DR 21/Descriptive Geometry
Bearing and slope of a line, piercing point, edge view and projection of oblique planes by auxiliary view and revolution, visualization of lines and planes. Development of surfaces by parallel, radial line and triangulation methods. Regular shapes both right and oblique, truncated shapes, curved surfaces both single and double, transition pieces, flat surfaces and intersection of solids.

DR 22/Blueprint and Drafting
Study of a specific set of blueprints and specifications for a commercial-type installation; preparation of riser diagrams, wiring layouts and sketches from the above set of plans, with references to the Canadian Electrical Code rules and regulations.

DR 24/Drafting and Blueprint Reading
Aligned, revolved and auxiliary sections. Threads and fasteners. Fits and tolerances. Surface finish. Basic welding symbols. Simple development. Freehand sketching.

DR 28/Drafting
Auxiliary views, sections assembly drawings, drill and drill systems, materials, introduction to working drawings, conventions and notes, piping symbols.

DR 30/Drafting
Preparation of simple floor plans for masonry construction, brick coursing for window and door openings, wall sections and details, sections and details for steel frame construction.

DR 31/Drafting
Drawing of frame wall section, stair layout from floor plans and material estimates, form work details.

DR 32/Blueprint Reading
Electrical graphical symbols, analysis of various types of electrical drawings used in both commercial and industrial projects, study of one or more sets of plans with emphasis on the electrical sections, estimating electrical materials and preparation of sketches from above plans.

DR 33/Drafting
Types of piping drawings, single line, double line, isometric, pipe fabrication, drawings, piping symbols, plan reading of steam and hot water systems, boiler room piping and diesel engine, pipe hangers.

DR 34/Drafting and Blueprint Reading
Specifications of materials, structural steel shapes, piping symbols and piping drawings, welding drawings, tolerances and surface finishes.

DR 35/Drafting
Room, door and window schedules, interior wall elevations, estimating wall and ceiling surface areas, estimating cost of decoration.

DR 36/Drafting
Representation of structural materials used in metal lathing, preparation of large scale details of various partitions, large scale details of various partitions, large scale details of column and beam furring, details of suspended ceilings, light troughs, reflected ceiling plans.

DR 37/Drafting
Piping symbols, isometric drawing of drains, venting and fixtures, isometric drawing of complete plumbing systems, layout of complete septic tank system.

DR 38/Drafting
Assembly drawings: interpretation of shop and industrial prints, isometric piping and ducting layouts, plan reading of construction of blueprints, architectural symbols, graphs, mechanical plans for air conditioning systems.

DR 39/Drafting
Determining sizes of round duct work by calculation and graphically drawing floor plans and laying out trunk and branch ducts, sizing and estimating materials required.

DR 40/Drafting and Blueprint Reading
Sub-assembly and assembly drawings. Cams and gears, casting. Production tooling. Freehand sketching and machine drafting.

DR 41/Drafting and Blueprint Reading
Cams and gears. Production tooling and presswork dies. Freehand sketching and machine drafting.

DR 42/Descriptive Geometry
Welding drawings, elements of the welding symbol, single and double combination, types of welds and welded joints. Structural steel shapes and standard mill sizes. Vector geometry, the use of vectors. Space, funicular and force diagrams. Equilibrium, resultants, Bow's notation. Co-planar, concurrent forces, bending moment and shearing force diagrams. Non-coplanar, non-concurrent forces, forces and stresses in structural members. Applied vector geometry.

DR 100/Technical Drawing
Equipment, instruments and materials. Pencil technique, lettering, geometrical constructions. Orthographic projection. Pictorial drawing; oblique, isometric. Dimensioning; fractions, decimals, Ford Rule, dimensioning systems. Freehand drawing; orthographic, isometric, proportions, notes. Sectional views; full, half, offset. Section lining, conventions. Auxiliary views; primary and secondary. Fasteners; threads, threaded products, terminology, symbols, rivets, keys, welding, brazing. Pipe fittings and valves; types of fittings, piping drawings, symbols. Assembly drawing; sectional views, exploded assemblies, bills of material. Detail working drawings; surface finish, tolerances, manufacturing methods. Cams; motion, displacement diagrams, cam profiles. Gears; principle types, terminology, manufacturing. Developments; basic descriptive geometry, parallel and radial line developments. Electrical and electronic drawing; symbols, wiring diagrams, instrumentation symbology, block diagrams, printed circuits.

DR 101/Machine Drawing I
Selection of principal views using third angle orthographic projection drawing system. Sectional and auxiliary views. Graphs and charts. Axonometric drawing systems and dimensioning. Conventional drawing practices. Drawing office standards. Dimensioning methods and systems. Preparation of detail working drawings involving tolerances, limits, machine fits and finishes. Machine details such as fasteners, keys, springs, taper pins, and their purposes, selection, and applications. Thread systems; terminology, representation, specifications, standards and applications. Materials of modern industry; ferrous metals, non-ferrous metals and plastics. SAE numbering system for steel, heat treatment of steels small tool operations. Technical sketching in the orthographic and the isometric systems. Drawing office systems and work routines; filing systems, change notes, design and layout procedures, printing of drawings, print distribution and records. Common devices and mechanisms such as springs, cams, gears, clamps. Permanent assembly of parts by welding, brazing and soldering. Types of welding. Canadian Welding Bureau symbols and recommended practices. Design of fabricated and welded parts; special design and production techniques for welded products.

DR 102/Architectural Drafting I
Review of lettering, dimensions, symbols, and conventions as applicable to architectural drafting. Construction methods and use of materials for masonry and frame construction, stairs, chimney and fireplaces, floor and roof construction, millwork, windows, doors and interior partitions. Interpretation of by-laws and use Building Construction Index. Preparation of working drawings of plans, sections, elevations and details of frame and masonry construction from preliminary drawings and design sketches. Elements of lathing, plastering and bricklaying and mechanical installations of plumbing, heating and electrical systems. Sketching and delineation of presentation drawings and construction of presentation scale models. Building code interpretations and application form an integral part.

DR 103/Electrical Design Drafting
Review of drafting procedures, electrical symbols and electrical drafting layouts for residential, commercial and industrial installations, single and three phase branch circuit wiring systems. Lighting layout, HEPC rules and regulations, wire calculations and grounding. Electronic symbols and layouts including working and schematic drawings.

DR 104/Piping Drawing
Orthographic drawing, auxiliary views, types of sections, isometric and oblique drawing. Screw threads and screwed fasteners. Types of pipe, pipe sizes and schedule numbers. Types of joints, fittings and valves. Methods of representing pipes, fittings and valves—single and double line symbols. Orthographic, developed, oblique and isometric piping drawings. Schematic and flow diagrams, single and double line. Selection of pipe, fittings and valves from catalogues. Fabricated piping intersections and developments.

DR 105/Technical Drawing
Review of drafting equipment and instruments, their use, selection and care. Review of geometrical constructions, and terminology. Orthographic projection, principal views, pencil techniques, alphabet of lines and basic dimensioning. Visualization problems involving missing lines and missing views. Principal views in alternate positions. Advanced detail working drawings. Sectional views; full, half, offset, removed, and revolved. Conventional practices and section lining symbols. Small tool operations, surface finish, tolerances, dimensioning problems, specifications and notes on drawings. The SAE numbering system for steels. Technical freehand sketching. Welding drawings. Standard welding symbols as authorized by the Canadian Welding Society. Assembly drawings, bills of material and estimating. Manufacturing processes. Heat treatment of steels. Electrical and electronic symbols, circuit diagrams and schematic diagrams. Symbols for pipe fitting and valves. Piping standards and specifications. Piping drawings. Isometric drawing and freehand sketching. The study of industrial blueprints and specifications.

DR 106/Architectural Drafting I
Introduction to dimensioning, symbols and conventions as related to architectural drafting. Methods and materials for frame and masonry exterior wall construction, finish materials and application, fireplace and chimney construction, flashing and millwork. The interpretation of the National Building Code in conjunction with the preparation of working drawings of plans, sections, details and elevations. Introduction of rendered elevations and perspectives.

DR 107/Mechanical Installation Drafting I
Piping symbols, plumbing systems, drains and vents, pressure systems, septic tank systems and sewers; types of hot water heating systems, boilers and connections; oblique and isometric piping plans.

DR 108/ Structural Drafting I
Structural steel: design of simple beams, simple connections, detailing practices. Reinforced concrete: framing plans, detailing beams, slabs, walls, bar schedules.

DR 109/Electrical Installation Drafting I
Electrical symbols, preliminary studies of residential, commercial and industrial layouts. Wiring systems for single and three-phase layouts. Theory and calculations of lighting layouts and types of lighting fixtures.

DR 110/Building Construction
Reinforced concrete, structural steel, timber, mechanical installations, construction methods for various types of construction, interpretation of architectural working drawings, plans, sections, elevations and details.

DR 111/Mechanical Drafting
Mechanical drawing techniques including views, sectioning, conventions, standards and dimensioning. The properties of metals, processes, types of weld and welding symbols. Pipe drawings, riser diagrams, heating and plumbing systems.

DR 112/Architectural Drafting
Three view drawing, alphabet of lines, invisible edges, dimensioning, sections and material symbols, freehand sketching, isometric drawing, architectural symbols and conventions. Preliminary study of various types of construction, materials and structural members. Plan study of architectural drawings and details.

DR 113/Drafting
Neatness and accuracy, care of instruments; lines and angles, measurement and bisection; division of a line; construction and use of scales, the diagonal scale. Construction of plane figures, triangles, regular and irregular polygons; enlargement and reduction by ratio of sides. Properties of the circle and its tangents; the ellipse; the parabola. Solid geometry; orthographic projection of regular solids: cube, cylinder, triangular and hexagonal prisms and pyramids.

DR 114/Drafting
Section, surface development and auxiliary views of regular solids including the cone. Orthographic projection of simple brackets and component machinery parts. Isometric projection, free hand sketching of simple machine parts. Standard conventions.

DR 115/Structural Drafting
Interpretation and preparation of design drawings for structural steel and reinforced concrete structures. Detail drawings of steel beams, columns. Design of bolted and welded framed connections. Design drawings and bar lists for reinforced concrete foundations, beams, columns, floor slabs and walls.

DR 116/Drafting
Extensive plan interpretation of residential, commercial and industrial buildings. Piping symbols, pictorial piping drawings, plan study of mechanical installations, boiler and piping layouts, air duct layouts. Electrical symbols and study of electrical wiring plans.

DR 117/Drafting
Instruments and materials. Geometric construction. Orthographic multiview projection, auxiliary views and sections. Dimensioning, tolerances and fits. Freehand sketching: oblique, isometric and multiview projections. Drawings of ships' construction: cross-sections of vessels, types of decks, pillars and hatches. Cargo plans.

DR 118/Descriptive Geometry I
Orthographic projection, primary and secondary auxiliary views. Basic descriptive geometric principles, points, lines, planes, true lengths and true shapes found by auxiliary views and by revolution, skew lines, piercing point of a line and a plane. Development of surfaces by parallel line, radial line and triangulation methods. Pattern drawing for sheet metal and plate fabrication, seam allowances, bends, materials and production methods. Welding symbols, welding drawings, structural shapes and bills of material.

DR 120/Descriptive Geometry I
Theory of multiview projection, single and double auxiliary views, cartesian co-ordinate system of locating points in space, true length of oblique lines, principal lines, bearing and slope of a line, problems involving parallel lines, intersecting lines and skew lines, problems involving points and lines, plane surfaces, edge views, true shape by auxiliary view methods, a point in a plane, shortest distance problems, dihedral angles, locating a given figure in a plane, location of a circle on a plane by the edge view method.

DR 121/Descriptive Geometry
Orthographic projection, principal views, alternative positions, primary and secondary auxiliary views, isometric sketching, basic principles involving points, lines and planes, true shapes found by auxiliary view and revolution methods, strike and dip of a stratum, apparent dip, bore holes. Problems involving tunnels, sewers, slopes, ore veins and outcroppings, etc.

DR 122/Basic Electrical Drawing
Lettering, use of instruments, linework, orthographic projection, dimensioning, sections, architect scale, isometric projection, sketching. Electrical and electronic symbols, basic electrical circuit diagrams, transformers, relays, riser and block diagrams, residential wiring, illumination, and electric heating.

DR 130/Drafting and Blueprint Reading
Freehand sketching of simple and complex objects using multiview, isometric and oblique projections. Blueprint reading: study of methods of representation of objects including orthomultiview, isometric and oblique projection, dimensions and tolerances, notes and specifications, surface finish, auxiliary views, sections, threads and fasteners, gears and cams, simple developments, detail and assembly drawings, methods of reproduction of drawings.

DR 131/Drafting and Blueprint Reading
Three view drawing, alphabet of lines, invisible edges, dimensioning, sections and material symbols, freehand sketching, isometric drawing, architectural symbols and conventions. Preliminary study of various types of construction, materials and structural members. Plan study of architectural drawings and details.

DR 132/Drafting and Blueprint Reading
Alphabet of lines. Orthographic multiview projection. Dimensions and notes, tolerances and fits. Sections and auxiliary views. Pictorial drawings. Freehand sketching. Mechanical drafting. Interpretation of electrical drawings.

DR 133/Electronic Drafting
Use of instruments, orthographic projection, lettering, dimensioning, sectioning, sketching and isometric drawing. Application of graphical symbols in point-to-point, highway, airline diagrams. Description of cableforms, wire harnesses and locking devices. Materials and finishes, chassis and panel design. Printed circuit design.

DR 134/Plate and Structural Layout
Drafting equipment; selection, use and care. Basic geometrical constructions and terminology. Review of orthographic projection. Primary and secondary auxiliary views. Dimensioning problems and methods. Parallel line and radial line developments. Basic descriptive geometry principles; true length of lines, true shape of planes, true angles, by auxiliary view method. Dihedral angles, revolutions and intersection of planes. Developments by triangulation. Structural shapes, symbols and specifications. Plate sizes and specifications. Layout and development of plate and structural projects of a practical nature. Bills of material and shop notes.

DR 135/Blueprint Reading
Drafting equipment and instruments, their care and use. Basic geometrical constructions, terminology, pencil techniques, lettering, drawing to scale. Orthographic projection, principal views, alphabet of lines, detail working drawings, dimensioning principles, visualization. Primary and secondary auxiliary views. Freehand technical sketching using the orthographic system. Small tool operations, notes, specifications, tolerances, manufacturing standards. Reading of industrial blueprints of detail parts, and of welded and fabricated parts. Sectional views; full, half, removed, revolved, and offset. Section lining symbols and conventions. Structural shapes, symbols and specifications. Bills of material. Reading of industrial sub-assembly and final assembly welding drawings. Isometric drawing of detail and assembly drawings. Isometric freehand technical sketches.

DR 136/Drafting
Drafting equipment, use of instruments, geometrical shapes and construction, orthographic projection, dimensioning, sections, auxiliary views, isometric drawing, piping drawing, flow diagrams, single line and double line layouts, isometric piping, fabrication drawings, construction drawings.

DR 137/Applied Drawing
Standard drafting equipment, use and care of instruments, terminology, basic geometric constructions. Third angle orthographic projections using the principal views. Drawings of mechanical parts, lettering, basic dimensioning principles. Freehand engineering sketches. Auxiliary views. Principal types of sectional views, conventions, and standards. Pictorial drawing using the oblique and isometric systems. Piping drawings and sketches. Piping symbols. Reading of blueprints, conventional practices, standard abbreviations, specifications, material lists. Electrical and electronic symbols. Schematic diagrams and instrumentation control systems.

DR 140/Drafting and Blueprint Reading
Alphabet of lines. Orthographic multiview projection. Dimensions and notes, tolerances and fits. Screw threads and fasteners. Sections and auxiliary views, pictorial views. Freehand sketching and machine drafting.

DR 147/Blueprint Reading
Drafting equipment and instruments, their use and care. Basic geometrical constructions, pencil techniques, drawing to scale. Orthographic projection, principal views, alphabet of lines, working drawings. Single auxiliary views. Basic dimensioning principles. Technical freehand sketching using the orthographic system. Small tool operations, notes, and specifications. Study of welding details and industrial drawings. Commonly used welding symbols approved by the Canadian Welding Society. Structural shapes, specifications and symbols in common use. Print reading of industrial welded sub-assembly and final assembly drawings. Sectional views; full, half, revolved.

DR 151/Architectural Drawing
Basic architectural drawing practices, use of instruments, lettering, symbols, detail tracing, working drawings; structural drawings and details; survey drawings and maps; ink linework and lettering; Leroy, applique and template lettering.

DR 152/Mechanical Drawing
Orthographic drawing, dimensioning, machine detail and assembly drawings, welding symbols, pattern development and layout, single and double line piping drawings, isometric drawings.

DR 153/Schematic Drawing
Basic electrical and electronic drawing practices, template drawing, symbols and conventions, circuitry schematics, schematic diagrams; tape graphs, charts and tape drawings.

DR 154/Art and Presentation
Freehand sketching, presentation media, pictorial drawing and rendering, use of water colours and charcoals, tinting and shading, technical illustrations, model making.

DR 155/Drafting and Blueprint Reading
Basic drawing principles and procedures, freehand sketching. Electrical and electronic symbols, layout for incoming services, pictorial drawing, control schematics, wiring diagrams, and printed circuits. Introduction to related piping, detail and assembly drawings.

DR 156/Drafting and Blueprint Reading
Basic drawing principles and procedures, freehand sketching. Electrical and electronic symbols, layout for incoming services, motor control and circuit protection diagrams, schematics, wiring diagrams and rectifier circuitry. Generator and motor diagrams, armature and stator winding diagrams. Introduction to mechanical detail and assembly drawings.

DR 157/Drawing
Instruments used in drawing, usage of drawing equipment, orthographic multi-view projection, visualization of oblique and isometric drawings, basic drawing and drafting fundamentals, geometric construction, practical application of basic drawing principles in producing simple member sketches.

DR 201/Machine Drawing II
Detail working drawings of an advanced nature. Design layout drawings drawn from engineering information and specifications. Projects involving various types of bearings, cams and gearing. Use of manufacturers' catalogues, standard parts, and engineering reference books. Manufacturing tolerances, allowances, machine fits and dimensioning systems as related to product design and manufacturing methods. Application of machine components including linkages, toggles, levers, eccentrics. Design principles and applications of basic gauges such as snap, plug. General design principles of jigs and fixtures. Application of commonly used jogs such as drill, plate, etc., and application of machine fixtures. Basic principles and applications of structural drawing. Checking drawings SAE codes and official specifications.

DR 202/Architectural Drafting II
Review of first year work, working drawings of commercial, industrial and institutional buildings, details of foundations, masonry and curtain walls, structural steel, reinforced concrete and laminated wood details, schedules, custom details, mechanical equipment, sanitary services, electrical services, presentation.

DR 203/Electrical Drafting
Introduction and preparation of the main types of electrical drawings including one line, schematic and wiring diagrams used in commercial and industrial installation. Estimating electrical materials from plans. Preparation of electrical job specifications. Wire and cable calculations.

DR 204/Process Piping Design
Layout of pressure vessels, pumps, piping, etc. with respect to flow characteristics, architectural, structural and electrical features. Arrangement of pipe hangers, flexibility of piping system, use of anchors, cold springing, etc. Interpretation of flow sheets and specifications, and the various piping codes for steam, water, oil, gas, etc. Special applications of valves, strainers, steam traps, venting, drainage pressure controllers and regulators. Study of special operations, condensing, evaporators, boilers, de-aerators, heat exchangers, pumps, etc. Use of tables and charts for calculation of pipe sizes and pressure drop. Estimation of piping costs.

DR 205/Electronic Design Applications
Review of electronic drafting procedures, wiring and connections. Printed circuits, micro electronics and transistor circuits. Layout selection and positioning of components, wiring and harness layouts. Electronic testing and environmental effects electronic estimating.

DR 207/Kinematics (Graphical)
Techniques of mechanism analysis. Displacement (linear, angular): paths of points on rotating bodies, producing specific paths. Linkages: to produce a given path, basic four bar, crank and slider, quick return, reverse, slow motion. Graphic analysis of motion velocity and acceleration, gears and gear trains, cams.

DR 208/Electrical Installation Drafting II
Layout of switchboards, distribution systems, central systems, electric heating systems. Production of drawings for electrical installations for industrial and commercial buildings. Preliminary study of HEPC regulations.

DR 209/Structural Drafting II
Design and detail of girders, columns, built-up members, trusses, floor systems in steel. Reinforced concrete design and detail of girders, columns, T-beams, buttress and cantilever walls, ribbed slabs, stairs. Heavy timber construction design and detail, beams, columns, and trusses.

DR 210/Mechanical Installations Drafting II
Detailing and layout of steam systems, sprinkler systems, refrigeration, air conditioning and forced air duct systems in connection with residential, commercial and industrial buildings.

DR 211/Architectural Drafting II
Review of first year work, working drawings on commercial, industrial and institutional buildings, details of foundations, masonry and curtain walls, stairs, structural details, schedules, custom details.

DR 220/Descriptive Geometry II
Plane surfaces, intersection of a line and a plane, intersection of two planes, intersection of planes and polyhedrons, location of a line perpendicular to a plane, dihedral angle between two oblique planes, shades and shadows, visualization of lines and planes, revolution of points, lines and planes, intersection and development of surfaces, using parallel line development, radial line development, and triangulation, practical pattern development problems.

DR 221/Descriptive Geometry
The location of points and lines in a plane, the slope of a plane, problems involving skew lines, intersection of two planes, intersection of lines and planes, dihedral angles, intersection of surfaces —plane and curved, cutting planes, location of workings, intersection of views, faults, outcrops, profiles and sections, contours, cuts and fills along level roads and along a grade road, practical problems and drawing practice, revolution and counter-revolution methods of solving practical problems.

DR 222/Descriptive Geometry II
Principles and applications involving oblique surfaces. Lines and points in oblique planes. Location of plane figures in oblique planes. Intersections of lines and planes, oblique lines, oblique plane and polyhedron. Dihedral angles. The system of revolution for finding true length of oblique lines, true shape of oblique planes, dihedral angles. Use of counter-revolution. Development of surfaces and intersected polyhedrons by triangulation. Pattern and development drawings, bend allowances, seams, and methods of joining. Single curved surfaces. Development of transition pieces. Double curved surfaces. Contoured surfaces and practical applications such as ships' sheer drawings. Problems which pertain to a wide range of general machine and mechanical industries.

DR 223/Drafting
Loci, simple problems on Loci; slides crank mechanisms, points and lines in space. Interpenetration of surfaces, curves of interpenetration of regular solids with axes at right angles. Fastenings: bolts, nuts and studs, standard screw threads, keys, cotters, pins, rivets and riveted joints. Bearings: pedestal and foot-step, ball and roller, lubrication. Couplings: simple shaft couplings, universal couplings.

DR 224/Drafting
Engineering details: simple machine tools, steam and other engine details: pistons, piston and connecting rods, stuffing boxes, crossheads and slides, slide valves and cranks. Types of valves and components for fluid systems. Standard symbols.

DR 225/Materials and Processes
A study of the materials used including cast iron, steel, special alloys, non-ferrous metals, glass, rubber, etc. as applied in the process piping industry. Welding types and methods. Welding symbols and design considerations. Plastics; thermoplastic and thermoset, types of materials and their fundamental characteristics, principles of the main processes, production methods and techniques. Processes used in the food, beverage, petroleum, chemical industries, and a study of the sequence of processes. Visits to processing plants of these industries and others will form a comprehensive part of this course.

DR 226/Electronic Design Applications
Review of electronic drafting procedures, wiring and connections. Printed circuits, micro electronics and transistor circuits. Layout selection and positioning of components, wiring and harness layouts. Electronic testing and environmental effects, electronic estimating.

DR 227/Electrical Design Applications
Layout of switchboards, distribution systems, low voltage signal systems and electrical heating systems. Calculations for illumination and heat loss. Meters, mechanical design of related electrical equipment and transmission towers. Electronic chassis layouts and printed circuits. Complete design drawings for electrical installations for residential, commercial and industrial projects.

Economics

EC 100/Economics
Semester I: Forms of economic and business organization, supply and demand, money and banking, personal finance, international trade, business cycle, investment, insurance, uses and sources of credit, taxation.
Semester II: Cost analysis, human relations, sales, government law regulations, social services, classified financial statements, basic bookkeeping practices, proven promotion methods, advertising.

EC 101/Business Organization
Major economic processes, primary industries, manufacturing, distribution and service industries. Ownership and structure of business enterprises. Forms of public ownership. Major functions of the business enterprise, product development, purchasing, industrial relations, manufacturing, marketing.
One Semester

EC 102/Engineering Law and Administration
Semester I: Legal positions of electrical designer and responsibilities of engineer and architects. Small office organization and procedures. Public relations and salesmanship.
Semester II: The labour code, strikes, walkouts, responsibilities of construction firm and labour unions. Professional ethics. Economics and efficiency of design.

EC 112/Business Organization
Forms of business ownership. Personnel. Labour unions and forms of agreements. Production planning and control. Organization of a plastics manufacturing plant.

EC 210/Economics I
Basic economics and industrial organization: forms of economic organization and their strengths and weaknesses. Monetary theory —money, credit and banking, Canadian banking system. Forms of business organization and business financing.
One Semester

EC 211/Economics II
Supply and demand business cycles and compensatory countercyclical fiscal policy. Labour economics. Insurance. Civics, organization of federal, provincial and municipal government. The place of the food service industry in the economic structure of the nation.
One Semester

EC 212/Business Organization
Administrative and office services. Auto data processing. Short, medium and long term financing and functions and methods of marketing. Sales and sales promotion activities.

EC 213/Business Administration
Analysis of business organization in the area of marketing, finance and production. The policy group, the administrative group. Organization and co-ordination. Types of organization, managemental controls. Functions of management.
One Semester

EC 300/Business Management
The Manager's function in the organization and operation of a business. Pitfalls to be avoided; problems of planning; providing the capital; organization of the business; purchasing the stock; record keeping; credit and collections; depreciation and profit; insurance, merchandising; advertising and sales; employment and personnel; business control; relations to the community. Both large and small businesses are considered, with emphasis on the latter.

Education

ED 160/Teaching Techniques
Theories of learning, individual differences, adult learning, subject analysis, lesson planning, curriculum development; lesson types, teaching aids; evaluation, practical work, theory; practice teaching; critical appraisals of teaching techniques. The course is arranged to provide each student with several opportunities for practice teaching and for developing an appreciation of effective techniques. Before attending classes students are advised to read J.R.Kidd, How Adults Learn, Associated Press.

Electronic Data Processing

EDP 100/Introduction to Electronic Data Processing
Study of the development of data processing systems from manual methods through unit record equipment to the business computer. Examination of concepts and terminology. Study of the components of data processing systems.
One Semester

EDP 105/Introduction to Computer Programming
Analysis of typical business problems solved by computers. Techniques and procedures of documentation and flow charting in programming. Introduction of symbolic coding and assembly programming systems.
One Semester

EDP 200/Data Processing Computing Systems
Study of computer systems and peripheral equipment. Computer soft ware, computer operating systems. Advances and limitations of various systems in relation to specific applications.
One Semester

EDP 201/Data Processing
Objectives of systems analysis and design. System flowcharts, decision tables and trees. Data processing standards. Documentation of systems.
One Semester

EDP 205/Computer Programming
Study of computer languages: machine code, assembly language, higher level languages, applications of ALGOL, COBOL, FORTRAN
One Semester

EDP 206/Computer Programming
Computer techniques for industry, commerce and public administration: costing, control and accounting, statistical work and forecasting. Programming in suitable languages.
One Semester

Electrical Technology

EL 10/Electrical Construction I
How to use the Hydraulic Bender: Electron Theory; Ohm's Law; Circuit Theory; Communication Devices; Circuit testing; Power, Chemical Cells: Introduction to HEPC Regulations; Conductors; Wire Calculations: Services; Control of Lighting Circuits; Wiring Methods; Distribution Systems.

EL 11/Electrical Practice
Wiring methods including conduit work, armoured cable work, alu-sheath, pyro-tenex, surface raceway, non-metallic sheath cable, bulldog strip; Circuitry practice including series, parallel and series parallel circuits; Ohm's law practice.

EL 20/Electrical Construction II
Magnetism: Electro-magnetism; Power (Introduction), Induction; Direct Current Generators; Direct Current Motors and Controls; AC Theory.

EL 21/Electrical Practice
Advanced wiring methods; Hydraulic bending; service; Circuitry practice including closed circuit alarms, open circuit alarms, apartment communications systems; Basic AC and DC equipment projects.

EL 30/Electrical Construction III
Alternating Current: theory, systems, equipment.

EL 31/Electrical Practice
Complex AC and DC equipment projects including DC generators; transformers both single and poly phase.

EL 40/Industrial Electronic Controls
Types of electronic tubes, amplifiers, tube circuitry and application, shop work, power supplies, principle of timers, welding timers, current control with gas tubes, thyraton contactors, ignition contactors, phase shifting, welder heat control, resistance welders, sequence weld timers, synchronous weld timers, shop work, photo-electric relays, heat controls, light dimming controls, principle of speed and voltage regulators, speed regulators for small DC motors, voltage control for DC and AC generators, singlephase and poly-phase power rectifiers, oscillators, inverters, induction heaters, dielectric heaters, high speed light relays, register control servomechanisms, solid state devices and controls.

EL 41/Electrical Practice
Practical applications of the various components and systems studied in the theory section.

EL 100/Electrical Fundamentals
Basic electrical concepts: electron theory, emf. Ohm's Law resistance of conductors. Characteristics of DC circuits, Kirchhoff's Laws, power units, efficiency, electromagnetism, the magnetic circuit. DC measuring instruments, electrical measurements and systems of units, electromagnetic induction, Faraday's and Lenz's Laws, principle of rotating machinery, capacitance, alternating current, sine wave, relationship between effective value, average value and maximum value of current and voltage, characteristics of AC circuits, current and voltage as vector quantities, application of the J operator, LCR circuits, power in AC circuits, power distribution systems.

EL 101/Electrical Measurements
Electrical standards; current galvanometers; DC PMMC meter movements; design of multirange voltmeters, ammeters, and ohmmeters; instrument errors and their elimination; resistance measurement; DC bridge circuits; ground-fault location; insulation testing; voltage measurement and potentiometers; magnetic-flux measurement; AC indicating and recording instruments; instrument transformers; AC bridge circuits.

EL 102/Direct-Current Machines
DC machine construction; field and armature windings. Induced emf and counter torque; commutation; armature reactions; compensating windings; interpoles; operation of shunt, series, and compound generators; losses and efficiency; voltage regulation; generator test procedures; special DC generators; parallel operation. Operation of shunt, series, and compound motors; losses and efficiency; speed regulation; speed control; motor test procedures; special DC motors; motor selection. Manual starters; magnetic starters: DC relays and contactors. Control circuits. Maintenance.

EL 103/Electrical Lab I
Experimental proofs for the fundamental concepts of electrical circuits. Operation of diodes and triodes; rectifiers and filter circuits; simple amplifiers. Standard tests on DC generators and motors; parallel operation of DC generators. Connection and operation of manual and magnetic motor starters; operation of special DC machines; braking systems for DC machines; motor reversing. DC control circuits. Calibration of DC and AC indicating instruments; design and calibration of DC voltmeters, ammeters, and ohmmeters; resistance measurement; potentiometer design and operation; measurement of self inductance and mutual inductance; magnetic-flux measurement; insulation testing; instrument transformers; oscilloscope calibration and operation; induction-disc instruments; recording instruments.

EL 104/Electrical Fundamentals
Basic atomic structure; properties of conductors and insulators. Ohm's Law; series, parallel, and complex circuits; power; network theorems. Reluctance, inductance, and magnetic circuits, transients. Capacitance. Alternating-current generation. Voltage, current, and power in AC circuits. Reactance; impedance; phasor diagrams. Series, parallel, and complex circuits. Power, power factor, and Power-factor improvement. Resonance. Construction and operation of vacuum tubes; rectifiers and filter circuits; simple amplifiers.

EL 105/Electrical Fundamentals
Simple Electron theory of electric current: simple circuit theory, energy and power, conductors and insulators. Variation of resistance with dimensions and temperature; sources of EMF, cells and batteries, simple generators (AC and DC). Basic theory of alternating current, simple motors (AC and DC), control of common types of motors, operation and applications of voltmeters, ammeters, wattmeters and galvanometers. Simple bridge circuits and their use. Simple theory and use of cathode ray oscilloscope.

EL 110/Electrical Fundamentals
Nature of electricity; basic electrical units; simple series and parallel circuits, power, magnetism, inductance, capacitance, the nature of alternating current; reactance and impedance; series resonance circuits; measuring instruments; transformer principles.

EL 112/Electrical Laboratory
Practical experiments to confirm Ohm's Law; Development of measuring instruments; LR and RC time constants; Parallel and series resonant circuits. Vacuum tube and transistor circuits and component tests.

EL 120/Materials and Methods
The physical, electrical and chemical properties of organic and inorganic materials and their uses as conductors, insulators and structural members. Materials used in electrical design and methods used in manufacturing processes. Electrical estimating and specifications.

EL 121/Electrotechnology
Construction of matter. Electrical changes in basic motion, rates of flow, effects, magnetism, permanent and electro-magnet, basic theory, ferro and non-magnetic materials, force and pole strength, current electricity, units, power, energy, series and parallel, instruments.
One Semester

EL 122/Electrotechnology
Electrolysis, Faraday's Laws, ECE, primary and secondary cells, BH curves, resistivity, conductance, Lenz's laws, electrostatics, field, changes, capacitance.
One Semester

EL 123/Electrotechnology
Introduction to electricity, coulomb and the ampere, Ohm's Law, the series circuit, the parallel circuit, electric power, resistance measurements, the magnetic field, Ohm's Law for the magnetic circuit, sine wave analysis, the voltmeter and the alternator, induction.

EL 130/Electrical Fundamentals
Electron theory, sources of electricity, basic electrical quantities, Ohm's Law and its application, series and parallel circuits, symbols and schematic diagrams, magnetism, electro magnetism, wiring practice, common electrical hazards, motors, transformers, relays, test equipment, service analysis, vacuum tubes, transistors.

EL 133/Electrical Theory
The nature of electricity, basic electrical quantities, Ohm's Law and its application, electrical circuits, magnetism and electromagnetism, simple electrical generators, electromagnetic generators, circuit elements, power and heating effects, electric motors, transformers and rectifiers, electrical measuring instruments, automation electrical devices and transistors. Electrical circuitry and fault finding. A wide range of small heating and motor-driven appliances are dismantled and repaired.

EL 200/Alternating-Current Machines
Principles of polyphase induction motors; construction; stator and rotor windings; slip and rotor frequency; developed power and torque; starting torque and current; losses and efficiency; speed regulation; standard test procedures; circle diagrams and equivalent circuits; starters and starting methods. Single-phase-motor construction, operation, and testing; motor selection. Construction and operation of synchronous alternators; voltage regulation; voltage control; losses and efficiency; alternator test procedures; parallel operation; synchronizing methods. Synchronous-motor construction and operation; test procedures; starting methods. Special synchronous machines. Power-factor improvement through synchronous machines.

EL 202/Electrical Laboratory and Installations
Voltage, current, and power in balanced three-phase circuits; transformer operation; polyphase transformer connections; operation of DC generators and motors; DC motor starters; operation of polyphase induction motors; operation of synchronous generators and motors; AC motor starters. Installation methods for electrical equipment circuits, lighting fixtures and outlets, and including Lomax, BX, Conduit and Pyrotennax Branch circuiting. Main service installations for single and three phase systems for residential, commercial and industrial buildings. Installation of low voltage control systems.

EL 203/Power and Distribution
Three-phase systems; measurement of current, voltage, and power in balanced three-phase systems and single-phase circuits. Power-factor improvement. Primary and secondary distribution systems; distribution methods and equipment. Circuit protection and protective equipment; protective relaying systems. Metering systems and equipment. Street-lighting systems and equipment. Automatic voltage control.

EL 204/Electrical Machines
Construction of DC machines; DC field and armature windings. Induced EMF; communication; operation of shunt, series, and compound generators; applications; parallel operation. Special DC generators. Operation of shunt, series, and compound DC motors; motor selection. Motor starters; DC contactors and relays. Construction of single-phase transformers; transformer operation; polyphase connections and three-phase transformers. Construction of polyphase induction motors; induction-motor operation. Motor starters; braking systems. Single-phase motor construction and operation. Construction and operation of synchronous motors and generators. Special AC machines. Motor selection. AC contactors and relays.

EL 205/Power and Distribution
Polyphase systems; balanced and unbalanced three-phase loads; power, power factor, and power measurement; power-factor improvement. Transformer construction and operation; equivalent circuits and phasor diagrams; losses and efficiency; voltage regulation; test procedures; parallel operation; polyphase transformer connections; three-phase transformers. Primary and secondary distribution systems; street lighting.

EL 206/Industrial Electronic Control
Construction and operation of gaseous tubes; applications of gaseous tubes. Construction and operation of semi-conductor devices; applications of semi-conductor devices as rectifiers and amplifiers. Timing circuits and relays. Electronic motor-speed controls. Magnetic amplifier construction, operation, and application. Inductive heaters. Resistance welders and welding controls. Servomechanisms and servo systems. Pneumatic and hydraulic control systems. Integrated control systems.

EL 207/ Electrical Lab II
Experimental proofs for the fundamental concepts of polyphase circuits; polyphase transformer connections; transformer testing; polyphase induction-motor tests; induction generators and frequency converters; synchronous-alternator operation; alternator tests; parallel operations of alternators and synchronizing; synchronous-motor operation and testing; special AC machines; motor starting methods; braking systems; operation of gaseous tubes and circuits utilizing gaseous tubes; semiconductor operation; semiconductor circuits; magnetic amplifier operation; resistance welders; servomechanisms; electronic motor-speed controllers; fluidic controls

EL 210/Electronic and Pneumatic Controls
Electron tubes, diodes, triodes, pentodes, power supplies, audio frequency output stages, detection, intermediate frequency amplifiers, oscillators, converters, RF amplifiers, superheterodyne receivers, applied physics, pneumatic and electronic transmitters, pressure, level, flow and temperature control theory, proportional reset and derivative, temperature measuring devices, filled systems, thermocouple resistance bulbs, potentiometers, wheatstone bridge, radiation, analysis, speed, pH, humidity chromatography, oxygen analysis, control valves.

EL 221/Electrotechnology
DC machines, generators, motors, excitation starters. Illumination, Kirchhoff's Laws, inductance. Introduction to AC theory, vector analysis, AC instruments.

EL 222/Electrotechnology
AC theory, parallel circuits, resonance, power factor, three-phase circuits, star and delta connection, DC generators, and motors, lap and wave armature reaction commutation, inter-poles. Characteristics of Shunt: series, compound, paralleling, load-sharing, testing.

EL 304/Electrotechnology
Time bases, time base controls, electro-static deflection, cathode follower circuits, Miller time base generators, electro-magnetic deflection, strobe pulse, electronic aids.

EL 321/Electrotechnology
Transformers, single and three-phase, auto, double-wound, rotary types, EMF equations, losses and efficiency, regulation. Instrument transformers. Alternators, construction and principles, single and three-phase, simple windings, testing synchronizing load-sharing.

EL 322/Electrotechnology
Synchronous motors, principles, starting. Vee curves, operation, testing, construction. Induction motors, construction operation, three-phase motors of cargo and wound types, TS curves, starting, speed control, switch gear.

EMR 140/DC Motors
Series, shunt and compound, rewinding fields and armatures, operating principles, characteristics, testing, assembly, soldering. Conversion to DC generators, blueprint reading, electrical symbols, dimensions and tolerances, freehand sketching, electrical circuits. Detail of motor parts, diagrams of coils and coil formers, dimensioning.

EMR 141/Single Phase Motors
Dismantling, assembling, obtaining and recording rewind data, various connections, testing, general repairs of a mechanical and electrical nature, operating principles and characteristics, connection diagrams. Electrical power tools.

EMR 142/Three Phase Motors

Dismantling, assembling, obtaining and recording rewind data, star and delta connections and their multiples, testing and general repairs, rewinding, conversions for speed, frequency and voltage.

Electronics Technology

ELTC 100/Electronic Fundamentals

An introduction to two and three-element semiconductor devices with some attention to the analogous vacuum-tube devices. The topics will include the physical behaviour, graphical analysis and equivalent circuit analysis of these devices.

ELTC 101/Amplifiers

Amplifier circuits (tube types): stage gain, coupling methods, classes of operation, bias methods, load lines, power amplifiers, phase inverters, tone controls, distortion, types and causes, DB gain, IF amplifiers, grounded grid.

ELTC 102/AM-FM Receiver Circuits

Television principles: introduction to television station systems, camera tubes, video signal structure, general receiver characteristics, CRT, deflection circuits, high voltage section, sync circuits, video amplifier detector and AGC, video IF amplifiers, FM sound circuits, power supplies, tuners and antennas. Principles of FM: producing FM mechanically, FM terms and definitions, comparisons between AM and FM, reactance modulation, FM detectors, pre-emphasis and de-emphasis, FM detector alignment, FM receivers, FM stereo.

ELTC 103/Semi-Conductor Circuits

Basic transistor principles: review of atomic theory, semi-conductor physics, doping, semi-conductor diodes, bias techniques, transistor action, transistor configuration, amplifier circuits (transistor types); transistor characteristics, bias stabilization, transistor load lines, power amplifiers, phase inverters, complementary symmetry.

ELTC 104/Electronics

Electrical measurements; induction; capacitance; AC theory; reactance; capacitive reactance, impedance, resonance, transformers; various construction projects.

ELTC 105/Television Principles

A comprehensive study of television as a complete system. Encompassing such topics as composite video, tuners, intermediate frequency amplifiers, sync circuits, video amplifiers, deflection circuits, sound section, and picture tube.

ELTC 130/Electrical Fundamentals

Energy, Electricity, Resistors and Conductors, Cells and Batteries, Voltage, Current and Resistance, Ohm's Law, Electric Power, DC Circuits, Kirchhoff's Law, Capacitors, Electromagnets, Inductors and Induction, Lenz's Law, AC Sources, Vectors, Reactance, Impedance, Resonance, AC Power, Electric Meters, Transformers, Resonant Circuits, AC Circuits, Transducers.

ELTC 131/Electronic Fundamentals

Semiconductor Physics, Semiconductor Diodes, Transistor Operation, Transistor Characteristics, Transistor Amplifiers, Transistor Oscillators, Semiconductor Control Devices, Diode Tubes, Vacuum Tube Operation, Vacuum Tube Characteristics, Vacuum Tube Amplifiers, Vacuum Tube Oscillators, Basic Power Supplies, Electronic Meters, Cathode Ray Tubes, Oscilloscopes, Power Transfer and Impedance Matching.

ELTC 132/Radio and Sound Servicing

Communications Systems, Amplitude Modulation, Frequency Modulation, Demodulation and Detection, Troubleshooting and Maintenance, Test Equipment, Troubleshooting Radio Receivers, Servicing Techniques, Servicing Automobile Receivers, AM/FM Receivers, Radio Receiver Alignment, Sound Systems, Record Changers-Pickups, Tape Recorders.

ELTC 133/Fundamentals Laboratory

Parts Familiarization, Construction Techniques, Circuit Tracing, Meter Testing and Calibration, Construction of AC, DC, and Audio Circuits, Low and High Frequency Oscillators, Use and Calibration of Signal Generators.

ELTC 134/Pulse Circuits

Relaxation Oscillators, RC Circuits, Blocking Oscillators, Multivibrators, Sawtooth Generators, Clippers, Limiter, Triggering Circuits, Gating Circuits, Integrating Circuits, Differentiating Circuits.

ELTC 135/Television Circuits

Television System Requirements, Tuner Circuits, VHF Tuners, Video IF Section, Video Amplifiers, Picture Tubes, Sound Channels, Sync Signals, Sync Circuits and DC Restorers, Sweep Oscillators, Sweep Amplifiers, High Voltage Supplies, AFC Circuits, Automatic Gain Control, Low Voltage Supplies, UHF Tuners, Antennas, Transmission Lines, Complete Television Receivers, Servicing Techniques.

ELTC 136/Color Television and FM Multiplex

Color, Color TV Receiver Picture Tubes, Color Television Signals, Color Television Receivers, Color Sync Circuits, Color Tube Circuits and Assemblies, Color TV Test Equipment, Color TV Receiver Installation, Troubles Affecting the Mono-Chrome Picture, Troubles Affecting the Color Picture, Color Receiver Alignment, Stereo Sound Systems, Stereo FM Circuits, FM Detectors, Magnetic Recording, Compensating Networks, Tone Controls, Reproducers and Enclosures.

ELTC 137/Radio and Television Laboratory

Adjustment, Maintenance, Servicing, and Installation of Domestic Equipment including: Record Changers, Tape Recorders, Stereo and PA Amplifiers, AM, FM, and Multiplex, TV, Color TV, Solid State Equipment.

ELTC 200/Transistor and Pulse Circuits

Transistor theory, parameters, transducer gain collector efficiencies, quantitative analysis of small signal amplifiers, graphic analysis of power amplifiers, stabilization techniques, transistor switching characteristics, types of semi-conductor devices, wave shaping circuits, multivibrators, saw tooth generators.

ELTC 201/Computer Systems

Boolean algebra; computer arithmetic; logic circuits; matrices; matrix applications adders and subtractors; computer memories; core, drum, tape and flip-flops; peripheral equipment, flow charts, system operation. A series of extensive laboratory projects substantiates the above theory.

ELTC 202/Communication and Computer Systems

Communication systems: Radio, AM, FM, VHF and UHF Principles of Radar and Navigation Systems. Television; black and white and colored. Computer logic circuits, Boolean algebra adders and subtractors, computer memory systems, operation control units and input-output devices.

ELTC 203/Microwave Systems

Microwave propagation theory, waveguide hardware, methods of energizing waveguides, waveguide components, microwave tubes, microwave duplexers, measurement techniques, transmission lines, types of lines and characteristic impedance calculations. Smith charts: theory, normalized impedances and admittances, sending and impedance, load impedance, radar range equation, determination of ranges, azimuth and elevation, minimum range and range resolution, types of scanning, types of displays, single-ended mixers, magic tee balanced mixers, hybrid ring duplexers, monopulse radar duplexers, pulse modulators tuning units, calibration circuits, tuning and operation, FM and Doppler radar, MTI radar and monopulse radar.

ELTC 204/Radio-Telephone

Circuits and circuitry, the output stage and loudspeakers, the antenna and input stage, the power supply, the direction finder, block diagram, principal, care and maintenance, operation, the echo sounder, principal, block diagram, care maintenance and operation. The radio telephone, block diagram, care, usage and maintenance, requirements for a radio telephone licence. Laboratory: Projects shall include the crystal radio set, the simple superheterodyne receiver, the simple two tube receiver, circuitry and power control.
One Semester

ELTC 205/Navigation Equipment

The Gyro Compass, operation use and maintenance. Radar, its operation, use and maintenance, advantages and disadvantages relative and true motion displays, exercises in navigation and plotting on the radar similator. The Decca navigator, principles of operation and operation and use of equipment and charts. Loran, usage and use of Loran charts, principles. General subject review.

ELTC 211/Electronic Theory and Problems

Design factors and tasks, space planning, panel mounting racks, types of equipment. Modular design. Other design elements, design techniques, specifications and standards.

ELTC 212/Electronic Laboratory

Construction and testing of amplifiers, power supplies, AM/FM receivers and transmitter components; transistors and printed circuits.

ELTC 213/Materials and Processes

Conductors and insulators, resistors, capacitators and methods of production. Tolerances, electronic and physical; vacuum tubes, transistors etc. Types of materials and uses, specifications.

Engineering Technology

EN 101/Engineering Practice

Fundamentals of boiler design, mountings, furnaces, draught, fans, fuel systems and combustion.

EN 103/Applied Heat

Thermometry, heat units, specific heat, heat equivalents, transfer, laws of thermodynamics, energy.

EN 104/Applied Heat

Boyle's and Charles' Laws, Universal Gas Laws, gas constants, expansion and compression, specific heats of gases.

EN 105/Applied Mechanics

Mass, force, weight, scalar and vector quantities, British and Metric systems. Resultant and equivalent of forces: forces, resolution, triangle of, parallelogram of, moments, couples, levers, graphics.

EN 106/Applied Mechanics

Centres of gravity and centroids of area. Work power and energy machines MAVR Friction laws and coefficients.

EN 109/Metallurgy
Materials used in the construction of marine boilers and engines. Sources of various metals. Production methods of steel and iron. Castings. Steel and iron process. Steel and iron treatment. Various types of steel and iron. Steel alloys. Strength and composition of steel, iron and steel alloys. Properties of various ferrous metals. Testing.

EN 110/Metallurgy
Non-ferrous metals: sources and manufacturing methods, properties, treatments. Various alloys and their composition and properties. Strength and testing.

EN 111/Ship Construction
Types of ship, construction details, structure, cargo, accommodation, engines' spaces. Piping systems, methods of launching.

EN 201/Engineering Practice
Fundamentals and theory of: Reciprocating engines, their construction, operation and maintenance; work shop practice.

EN 202/Engineering Practice
Turbines: Impulse, reaction theory, construction, maintenance, condensers, gearing, shafting, and propellers. Workshop practice.

EN 203/Thermodynamics
Combustion: chemistry of combustion. Gravimetric and volumetric analysis. Stiochiometric quantity of air. Products of combustion by weight and by volume. Calorific value of a fuel, theoretical estimating, actual determination by calorimeter. Isothermal and Adiabatic operations. $PV^n = C$. Problems involving use of gas laws. Work diagrams. Air compressors, types and operating procedure. Index of compression.

EN 204/Thermodynamics
Properties of steam, wet, dry saturated and superheated. Relationship between pressure and temperature. Use of steam tables. Steam generators, shell and water tube boilers. Steam plant. Boiler thermal efficiency, equivalent evaporation. Methods of testing boiler performance. Orsat apparatus. Steam engines, simple and compound reciprocating engines. Theoretical engine diagram. Diagram factor. Determination of horsepower.

EN 205/Applied Mechanics
Triangle of forces and converse: simple framed structures, Polygon of forces, principle of moments applied to beam reactions and centre of gravity, etc., done graphically. Friction on the inclined plane work and power on the inclined plane, graphical representation of work. Stress, strain, Young's modulus, factor of safety and ultimate stress.

EN 206/Applied Mechanics
Compound wheel and axle, western pulley block, screw jack, worm and wheel, wheel table and belt drives, law of machines. Velocity and acceleration, distance-time graphs, equations of motion, motion due to gravity, angular motion. Energy, potential and kinetic energy, Newton's Laws of Motion, momentum and rate of change of momentum, centrifugal force, motion in a curve, simple governors.

EN 207/Strength of Materials
Physical properties of materials; destructive and non-destructive testing. Hooke's Law. Stress, strain and factor of safety.

EN 208/Strength of Materials
Compound bars; thermal stress, stress in thin shells with riveted and welded joints. Strain energy. Simply supported beams. Theory of bending; moments of inertia.

EN 210/Mechanics of Fluids
Density, relative density and specific gravity and flotation. Law of Archimedes. Fluid pressure; pressure head, barometers, manometers.

EN 301/Engineering Practice
Principles of machinery: steering gear, capstans, winches, evaporators, refrigeration, air compressors, air conditioning, pumping, flooding, fire-fighting.

EN 302/Engineering Practice
Fundamentals of internal combustion engines, gas turbines for propulsion and auxiliaries; introduction to nuclear power.

EN 303/Thermodynamics
Steam Turbines: impulse, reaction, velocity diagrams for steam turbines. Thermal efficiency, internal combustion engines, theoretical and actual engine cycles: Carnot, Otto, Joule and Diesel. Air Standard or relative efficiency. Determination of temperatures, pressures and volumes at state points of cycle. Ihp, Bhp, and Mechanical efficiency; Morse Test on Spark ignition engines.

EN 304/Thermodynamics
Rankine cycle for steam plant. Overall efficiency, steam plant trials. Engine testing. The gas turbine, applications to marine engineering. Refrigeration, types of systems, refrigerant performance, heat pump cycles. Revisionary examples on above.

EN 305/Theory of Machines
Vectors, force and motion, gravity, moments, couples, dynamics of simple engine mechanisms, centrifugal force. Simple harmonic motion, simple and compound pendulum. Friction: limiting angle, inclined plane, efficiency. Belt drives: tension HP.

EN 306/Theory of Machines
Velocity diagrams: acceleration diagrams, gears, slide valve, piston and load, flywheels. Balancing: dynamic, primary, imbalance. Governors, cams, steering gear. Vibration, whirling shafts, transverse and torsional oscillation.

EN 307/Mechanics of Fluids
Venturi and Orifice meters. Flowmeters. Force in a jet. Notches and Weirs. Friction in pipes, hydraulic gradient, syphon. Flow in open channels. Corresponding speed of a model. Viscosity, visco static resistance.

EN 308/Mechanics of Fluids
Pumps. Types and application. Frictional head. Total head. Volumetric efficiency. Slop. Cavitation. Simplex, duplex and three throw ram. Air vessels. Rotary displacement pumps. Centrifugal and turbine pumps, balancing. Calculation of speed for head required. Characteristics of pumps. Water turbines, centrifugal and axial flow types. Characteristics.

EN 309/Strength of Materials
Stresses in thin rotating rims due to centrifugal forces. Graphic statics. Simple frame structures.

EN 310/Strength of Materials
Non-destructive testing, deflexion, long and short columns. Euler's formulae, combined stress. Morh's circle, torsion and bending.

EN 311/Naval Architecture
Types of ships, measurement and classification, terminology. Rules of Classification. Coefficients of fineness, draught, buoyancy, permeability, stress.

EN 312/Naval Architecture
Stability, strength of ship, resistance and propulsion, stability and coefficients.

EN 313/Strength of Materials
Stresses in thin rotating rims due to centrifugal forces. Graphic statics. Simple frame structures. Determination of tensile or compressive loading. Forces in members.

English

ENG 10/English
Vocabulary of the trade: spelling, pronunciation and definition of trade terms. Classification of words: parts of speech, function of each part of speech. Use of words: qualities of a good sentence, unity, correctness, order of words, spelling and punctuation, diction and sound. Kinds of sentences: simple, compound, complex. Improving sentences: recognition and correction of common errors.
See note under ENG 14.

ENG 11/English
Vocabulary of the trade: spelling, pronunciation and definition. Basic grammatical and compositional forms: sentence structure, the paragraph. Oral and written expression of ideas.

ENG 13/Business English
Review of basic grammatical and compositional forms. Language: sentence structure, the paragraph, effective writing. Business correspondence: the study of various types of business letters and forms applicable to the trade. Oral expression of ideas: preparation and delivery of formal and informal speeches.
One Semester

ENG 14/Remedial English
The programme is based on diagnostic testing and individual instruction. The emphasis is on oral and written work and developmental reading. Through practice and self-evaluation, the student is encouraged to express himself effectively and also to read with comprehension.
Note: Under certain circumstances, ENG 14 may be taken in lieu of ENG 10, ENG 20, or ENG 30.

ENG 20/English
Expressing ideas (the paragraph): qualities of good paragraph, unity, coherence, topic sentence, contrast, correctness, paragraphs and general description, paragraphs on technical description, tools, equipment, processes, oral and written exercises followed by discussion. Vocabulary of the trade: spelling, pronunciation and definition of trade terms.
See note under ENG 14.

ENG 21/English
Communication: precis writing, business correspondence, business letters and forms applicable to the trade, technical writing. Developmental reading. Oral presentations.

ENG 30/English
Analysis and precis writing: passages from trade texts, journals, periodicals and specifications. Descriptive writing of short technical descriptions of tools and processes (sketch and describe). Technical writing: instruction and practice in the planning and writing of technical reports, reports on accidents, defective parts or appliances, complete job analysis and estimates. Speech: preparation, development and delivery of short speeches or lecturettes.
See note under ENG 14.

ENG 100/Language and Communication
Semester I: Oral and written communication. The development of clear, concise, well organized communication with specific application to technical writing and oral presentations. Assigned readings.
Semester II: Contemporary ideas. A study of modern literature and current issues. Written and oral presentations.

ENG 101/English
Precis writing, technical description, current reading, reading for enjoyment, reading for information.

ENG 103/English
Business communications: effective expression of ideas. Business correspondence. Technical writing; the technical report.
One Semester

ENG 110/Language and Communication
English composition: a review of grammar and composition (parts of speech; sentence, paragraph, and essay), effective and formal English in business communication. Rapid reading and comprehension, business letter writing: use of the positive approach to letters of application, sales promotion, the credit and collection letter. Oral reports, one modern novel.
One Semester

ENG 111/Language and Communication
Oral and written business communication: preparation and delivery of formal and informal speeches on related subjects, the precis, technical research report writing, using library research. A study of an anthology of modern short stories.
One Semester

ENG 121/English
Semester I: Oral and written communication: remedial and developmental. Technical writing and reports. Assigned reading.
Semester II: Business communications: effective expression of ideas. Business correspondence. Assigned reading.

ENG 130/Language and Communication
Semester I: Improvement in reading and studying. The following skills will be developed: reading for comprehension, reading for details, reading for main ideas, skimming for information, summarizing information, making notes.
Semester II: Oral and written expression—remedial and developmental. Topics for discussion and writing will stress the interests of students, with the aim that students may bring to their efforts in speech and writing sufficient motivation to develop effective structure and style. Remedial work in language and spelling will be included as required. Technical writing.
Note: Students under certain circumstances may take ENG 131 in lieu of ENG 130, ENG 132, ENG 141.

ENG 131/English for New Canadians
The emphasis in the course will be on oral and written work in English which attempts to overcome the problems faced by students whose native language is not English. Individual instruction will be emphasized, plus assignments to develop confidence and speed in speech, writing, and reading.

ENG 132/Language and Business Correspondence
Semester I/Language: Review of basic English grammar and composition, vocabulary of trade, spelling, pronunciation and use of trade terms. Use of dictionary, library. Sentence structure and paragraph structure. Reading for comprehension.
Semester II/Business Correspondence: Study of various types of the business letter and forms. Practice in writing and answering business letters applicable to trade. Preparation of business forms. Reading for comprehension.

ENG 141/Language and Communication
Understanding words: use of dictionary, building words, signs and slogans, choice of words. Sentence structure: qualities of good sentence, expression of ideas. Paragraph structure: logic, clarity, relevance, progression of ideas, Communication: precis writing, reading for comprehension, the technical report, business correspondence, oral presentations.
One Semester

ENG 200/Language and Communication
Semester I: The preparation and delivery of formal talks and lectures on technical subjects. The philosophy of good writing. Assigned reading.
Semester II: Technical research: study of basic library resources used in research. The technical report: organization and format. Assigned reading.
Note: Under certain circumstances a suitable combination of two courses selected from the section Elective (*Liberal*) *Studies and/or ENG 212, ENG 213, ENG 214, may be taken in lieu of ENG 200.*

ENG 210/Communication
A study of different aspects of report writing. Oral presentation of topics related to food management. Special attention will be paid to the positive approach to business communications. One novel or play may be studied.
One Semester

ENG 212/Communication
A study of the different aspects of report writing and business correspondence. The study will include the effective expression of ideas, the psychology of communication, and the conduct of business meetings.
One Semester

ENG 213/Speech
Content includes basic information about the speech process, impromptu speeches, formal speeches and debates. Through practice and self-evaluation, students will develop sufficient confidence and poise to speak effectively in most situations.
One Semester

ENG 214/Advanced Communication Skills
A developmental programme using a variety of material and techniques, including a diagnostic analysis. The programme is based on intensive individual instruction in a Language Centre. The course is designed to meet individual requirements in reading and writing.
One Semester

ENG 232/Technical Writing and Oral Communication
Semester I/Technical Writing: Study of trade journal, correct method of technical description. Precis writing as applied to trade journals. Original reports on technical subjects.
Semester II/Oral Communication: Study of public speaking. Preparation and delivery of formal and informal speeches in class. Conduct of business meetings. Assigned reading for comprehension.

ENG 332/Business Communication
Semester I/Advanced Business Communication: Advanced forms of business writing: employee regulations from communication standpoint. Further work in public speaking.
Semester II/Communication with the Public: Correct writing of advertising letters and brochures. Dealing with the public in written transactions. Professional organizations: conduct of meetings, minutes of meetings, records and bulletins. Assigned reading for comprehension.

Elective (Liberal) Studies

ES 200/History of Ideas in Western Civilization
This course allows the student to examine the history of ideas in Western civilization. In order to contribute to his society more fully, the prospective graduate of a technician program should be competent not only in his chosen vocational field, but also in the appreciation of the attitudes, values and ideals of his society.
One Semester

ES 201/History of Science and Technology
A seminar course which will examine the historical and philosophical developments leading to the so-called "scientific method" of examination of the Universe. The sociological impact of important technological changes from the use of wheeled transport to cybernetics will be reviewed with the intention of assessing the role of the technician in causing such technological change, and the extent of his social responsibilities regarding the use of technology.
One Semester

ES 205/Perspectives on Man and Society
A study of 20th century literature specifically chosen to develop understanding and insight into present-day society. Emphasis will be placed on free discussion in order to encourage students to develop effective expression of their own opinions. Writing assignments will stress original reactions to material studied.
One Semester

ES 215/Political Science (Economics)
Internal and international trade will be stressed. A certain amount of history will be covered leading up to Canada's present position in world markets.
Canada will be covered from early colonial days, trade between the colonies, and with the mother country, trade after confederation, reciprocity, pre World War I, the Twenties, the hungry Thirties, the effect of the second World War, and post war trade to current trends, including our present monetary setup.

ES 216/Political Science (Politics)
This course will deal primarily with political concepts and practices applicable to Canada.
Historical background, geographical and political divisions, federalism, legislative processes, provincial government, municipal government, internal policy and accompanying problems. Canada's foreign policies. Canada, stressing such situations as residential planning, social problems and federal-provincial relationships.

Food Technology

Quantity Food Production I, II and III
One Semester each

Food Products and Standards
Food products and standards: complete coverage of food products from A-Z, quality indications, availability, grades, standards, sizes, marketing methods, standard containers, convenience foods.
One Semester

Food Service Merchandising
Food service merchandising theory: menu merchandising, development of "theme" in food service area, types of food service, establishment of customer-employee contact standards, obtaining public recognition and good will, methods of advertising and promotion.
One Semester

General Orientation
Types of food service establishments and their organization. Departmental functions in various food service establishments. Challenge of work in food service industry and job opportunities available. Field trips to food processing plants and manufacturers, guest speakers from the industry.

Production Cost Control and Cost Accounting
Production cost control and cost accounting: Methods of controlling food, labour, and general expenses, food service operating accounting systems.
One Semester

Human Relations in Hospitality Industry
Exemplary supervisory action: attitudes toward customers and staff rules of etiquette, manners and dress, personal hygiene, sanitary food and equipment handling, safety, preventive maintenance of equipment.

Catering and Service of Food I and II
Catering and the serving of food: Students will learn table setting and table service in the school's dining room, and they will cook for, set up, and serve several large banquets during the periods set aside for this subject.
One Semester each

Meat-Cutting Theory
Sanitation and hygiene, accident prevention, introduction and proper usage of all personal and electrical equipment found in a meat department, types of refrigeration, meat counter and walk-in box, FIFO method, care, handling, receiving and holding of all meat, care handling, receiving and holding of all smoked meats and cooked variety meats, types of meat packaging, Food and Drug Act and Weights and Measures Act.
One Semester

Meat-Cutting Practice
The proper cutting and displaying of beef, pork, lamb and veal both for retail purposes and self-service stores, cutting tests, pricing retail meat cuts, figuring percentage of profit, operating expenses, and how to use merchandising aids.
One Semester

Dining Room Service
The food industry as a career, personal appearance, development of personality, expectations of the employer, tourist information, profit and loss, food service outlets, history of menus and menu construction, menu terminology, American, Russian and French service, condiments and sauces, sidework, tray handling, table setups, cheque book and sales tax, service to the blind and the child, seafood, fish, poultry, game, vegetables, salads, desserts, spirits, wines, cocktails, how to serve, suggestive selling, conduct on duty, co-operation with fellow workers, applying for a position, banquet planning, set-up and service.
One Semester

Theory of Food
Sanitation and hygiene, safety, equipment, refrigeration, purchasing, menu planning, culinary terminology, receiving, storage, and issuing, portion control and costing.
One Semester

Kitchen Practice and Foods Laboratory
Basic flavouring, herbs and spices, basic stock and sauces, soups, eggs, pasta and rice dishes, fish and seafood, basic preparations of meat, poultry and game, garnishes, potato and vegetable cookery.
One Semester

FOOD 145/Foods Laboratory
Larder and cold preparations: butchering, salads, dressings.
Bakery: basic preparations in the patisserie, quick breads, yeast leavened doughs, pies, tarts, cookies, puddings, ices, petit fours, fresh fruit desserts, cake decorations.
One Semester

Food Service Operation Supervision I and II
Food service operation supervision: circulation of students through the food service facilities of the school (kitchen, bakery, dish-room, cafeteria counter and cash register, dining room, store room, etc.) to assume various supervisory positions.
One Semester each

Management of Food Operations
Management of food service operations: personnel relations, staff training, job descriptions, production scheduling, labour legislation. Law pertaining to food service operations. Design of food service facilities. Methods of supervision and control over all aspects of food service operations.

Food Science Lab
Food science laboratory: detailed study of cooking methods, effect of various cooking media on foods, development of new recipes and new products, nutrition and diets, convenience foods.

Graphic Arts

GR 100/GR 102/GR 200/GR 202/Typographic Composition/ Hot Metal and Photo Composition
Principles of layout, design, type face selection, preparation of mechanicals, job planning including considerations for binding, hot metal composition, monotype and intertype or linotype.
Perforated tape and caster. Development of hot metal machines, their mechanism, and machine principles. Emphasis on speed and proper operation of teletypesetter, keyboard operation.
Marking proofs and proof reading. Problems of composition in French. Fundamentals of handling composition of tabular work, math. equations etc. Instruction in Ludlow composition.
Introduction to highspeed photocomposing equipment (Linofilm superquick, or Fototronic or Photon 713 or compugraphic photocomposing unit) with complete understanding of principles of optics, data processing, electronics as applied in the field of Photo composition.

GR 105/GR 107/Preparation/Photo-mechanical Reproduction
Sensitometry, optical laws, diffusion, flare, color temperature, reciprocity failure, Herschel, Sabather and Clayden effects. Calibration of dark room equipment to determine standard exposures and processing conditions for line and black and white halftone. How to program a black and white halftone reproduction system using densitometers, gammatrol, automatic processor with due consideration to type of paper for printing, ultra violet phenomenon, types of originals etc.

GR 205/GR 207/Color Separation
Concept of tone reproductions for letterpress, offset and gravure, plotting characteristic curves. Basic color theory, tone and color correction, concept of masking, proportionality and additivity failure, black Printer and UCR. GATF diagrams, colour circle, triangle to determine masking requirements, and paper behaviour. Electrostatic proofing and comparison with press proof.

GR 110/GR 210/Stripping and Imposition
Assembly of various line and halftone negatives on one piece of film through pin register system. Requirements for thinnies and fatties in a type; dot for dot sharpness and crisp detail in contact printing. Assembly of signatures for book layout. Step and Repeat. Color Stripping, dot etching, making screen tints etc.

GR 112/Paste-up and Film Imposition
Film Imposition, paste-up and page make-up. Project work is included.

GR 212/Printing Surface Preparation
The nature and durability of printing surface for planographic, intaglio and flexographic processes.
Presensitized offset plates, carbon tissue and copper etching with $Fe\ CL_3$. Calibration of plate-making and etching equipment. Introduction to Metallurgy.

GR 115/GR 117/GR 215/GR 217/Machine Printing
Rules regarding safety and shop procedures. Mode of construction of printing machinery. Automatic control, variable speed drives, bearings, theory of lubrication, gearing, differential gears, pneumatics, compressors, vacuum pumps. Major parts of the Printing-press and analysis of mechanical performance of printing machines under normal conditions, speed measurements, stroboscope, oscillographs, vibration and noise. Flow of ink in duct, behaviour of ink in nip rollers. Ink Tack. The effect of ink and water emulsification on ink flow characteristic of print quality. Viscosity and blade angle in a gravure press, ink composition for letterpress, offset, gravure and flexographic printing. Development of printing pressure by deformation of packing. Blankets and rollers. Impression, printing and blanket cylinders. Post impression operations, delivery system, spraying, static electricity and prevention of set-off, viewing conditions, standard lighting. Projects carried out in letterpress printing, small and medium size offset printing, one color as well as two color, flat bed gravure proofing press and a rotary flexographic press. Specific problems in each method of printing are discussed; and projects are included.

GR 120/GR 122/GR 220/GR 222/Quality Control and Statistics
Instruments of quality control to test incoming material and developing controls and standards during process from composition to finishing.
Printing-substrate: Fibrous and non-fibrous raw materials in common use, outline of paper, board, and foil manufacture, including sizing, calendering and coating. Properties of Printing-substrates in relation to their use in Printing and their testing methods.
Ink: Properties imparted to Printing inks by main classes of pigments, vehicles and other additions for letterpress, offset, gravure and flexography. Basic drying mechanisms. Introduction to testing methods. Solvent recovery, Densitometer Controls during Pressrun. Properties of boards, cover-papers, cloths and adhesives influencing behaviour and selection as bookbinding material, moisture expansibility and effects of storage conditions. Tests for such properties like strength, warping tendencies, creasing, folding, resistance to chemical attack on binding materials. Microscope to measure gravure cell depth and configuration of screen dots. Controls in exposure and processing of film through densitometer. Plotting tone reproduction—curves of color reproduction. Statistical methods and practice. Field trips to paper, ink, film plants, etc.

GR 125/GR 225/GR 228/Finishing Technology
Planning the job for a book, magazine or brochure including considerations for creasing, cutting, stitching, sewing. Set-up procedures for folding, collating, stitching, sewing, cutting, cornering, die-cutting etc. machines. Principles of program controlled guillotine. Gold leaf stamping on a letter-press machine. Familiarization with perfect binding. Making dies and creasing from a photographic line positive. Relationship between crease parameters and folding faults. Selection of creasing and cutting press settings. Methods of checking die and carton size, coating and varnishing procedures.
Students carry out projects from restoration to mechanized binding and carton making.

Hairdressing

Hair 10/Theory of Hairdressing
Ethics, history of hairdressing, hygiene, personality, sterlization and sanitation of equipment, anatomy and physiology, disease of the skin, scalp and hair, use of electrical appliances in hairdressing, facial treatment, make up, shampoos and rinses, hair tinting and bleaching, scalp treatment, hair cutting, finger waving, permanent waving, hair styling, manicuring, chemistry of materials.

Hair 11/Hairdressing Practice
Basic techniques concerning all phases of the trade are performed upon live models with emphasis on proper and safe working habits. Development of skills necessary to apply the principles outlined above. Personal development of students: poise, deportment, weight control, correction of standing, sitting and walking posture.

Heating

HT 100/Domestic Oil Burners
Types of domestic burners, parts of burners, filters, purpose of controls, nozzles, fuel line problem, draft, safety precautions, public relations, procedures for annual conditioning.

HT 101/Oil Burners
Theory of combustion, fuel units, transformers, storage, controls, circuitry, heating systems, service procedures, regulations and public relations.

HT 102/Heating
Electricity as applied to oil burners and heating systems.

HT 103/Heating
Evolution of heating, types of heating equipment and systems. Introduction to heat loss calculations.

HT 110/Heating
Design and lay-out of plans for warm air heating and air conditioning systems. Calculating heat loss and heat gain.

HT 111/Heating
Design and lay-out of plans for hot water, steam, electric heating and air conditioning.

HT 112/Heating
Electrical measurement, electrical and electronic controls and control circuitry.

HT 113/Heating
Type of commercial oil and gas burners, oil tank installations, preheaters and accessories, gas piping and venting for commercial gas burners, combination oil and gas unit, types of boilers and boiler conversions, firing sequence, flame failure protection, combustion control, logic diagrams, schematic wiring diagrams, commercial hot water units, make-up air units, energy code requirements.

HT 130/Domestic Oil Burners
Types of Domestic Burners, parts of burners, filter, purpose of controls, nozzles, fuel line problem, draft, safety precautions, public relations, procedures for annual conditioning.

HT 131/Oil Burners
Theory of combustion, fuel units, transformers, storage, controls, circuitry, heating systems, service procedures, regulations and public relations.

HT 132/Heating
Electricity as applied to oil burners and heating systems.

HT 133/Heating
Evolution of heating, types of heating equipment and systems. Introduction to heat loss calculations.

HT 140/Oil and Gas Burners
Combination oil and gas burners, pipe line, venting, general system requirements. Installations and safety requirements.

HT 141/Heating
Types and characteristics of hydronic heating equipment and systems. Heat loss calculations, ancillary equipment selection and installation. Types and characteristics of electric heating equipment and systems.

HT 142/Heating
Electrical measurement, electrical and electronic controls and control circuitry.

HT 143/Heating
Types and characteristics of warm air heating equipment and air distribution systems. Load calculations, ancillary equipment selection and installation.

Instrumentation

INST 100/Measuring Principles
CGS, MKS, and FPS system of unites. Dimensions and dimensional analysis.
Theory and construction of devices-mechanical and pneumatic for the measurement of pressure and vacuum, temperature, flow of fluids, viscosity and specific gravity.

INST 101/Electronic Instrumentation
Review of fundamentals, electrical pressure transducers, electrical flow devices, electrical level transmitters, electrical temperature transducers, potentiometric devices, indicating, recording and registering equipment, analytical instruments, radiation-type transducers, humidity-measuring devices.

INST 102/Instrumentation Fundamentals
Pneumatic and electronic means of sensing and controlling: pressure, level, flow, temperature, etc. Final Control elements. Analytical Instrumentation. Computer fundamentals.
ISA Symbols and Color Coding.

INST 103/Piping and Instrument Lab
Instruction and shop practice in pipe fittings, valves, hand tools, threading, flaring, bending, soft soldering, silver soldering, protection equipment, and power machine shop tools.

INST 104/Telemetering
Introduction and history, current, voltage, ratio frequency and impulse methods of telemetering. Multiplex systems, pneumatic and hydraulic methods, pick ups, links and channels, selection and application.

INST 130/Pneumatic Instrumentation
Applied physics, pressure, level, flow temperature measuring and transmitting instruments, humidity control, final control elements, controllers.

INST 131/Electronic Instrumentation
DC fundamentals, AC fundamentals, electronic pressure, level, flow, temperature, speed measuring and transmitting instruments, electronic controllers and final control elements, pH, spectrometry, chromatography fundamentals of digital and analog computers, electrical wiring techniques for control applications.

INST 132/Installation Techniques
Hand valves, threading, silver and soft soldering safety valves, steam traps, lubrication techniques, gasket materials, tubing techniques: flaring, bending, fitting, etc. Fabrication and installation of control loop piping and tubing.

INST 133/Analytical Instrumentation
Ph measurement and control. Gas chromatography. Humidity, oxygen analysis. Speed. Electrical and thermal conductivity. Spectrometry. Telemetering.

INST 200/Automatic Control Principles I
What constitutes a process, process characteristics-static and kinetic, responses of components and systems, energy characteristics of the process, the block diagram, feedback control systems—open and closed loop systems. Development of Controller Actions, proportional, reset and rate.

INST 201/Final Control Elements
Types of 'Top Works' and valve positioners, control Valve Sizing and their proper application. Other types of final operators, damper motors, saturable reactors, magnetic amplifiers.

INST 202/Analytical Instrumentation
Process analyzers discussed in detail, combustion, moisture, gas chromatography, ultraviolet and infrared analyzers, pH conductivity and oxidation reduction.

INST 203/Computer Control Principles I
Historical development of computing systems, fundamentals of analog computers, application of analog computers, basic principles of digital computers, computer elements, input-output devices and data conversion, registers, theory of programming computers, application of process and numerical control.

Ironwork

IRON 10/Ironwork I
Safety regulations, types of tools used, installation of rod work in footings, floor slabs, beams, columns, walls, piers and stairways, stacking and care of material on the site. Setting of base plates, care and use of mobile land rigs, cranes, guy derricks, stiff leg derricks, methods and procedures for performing the functions of hooking-on, tagging, signalling, connecting, fitting, bolting, use of power-activated tools. Tying knots and making bowline hitches, clove hitch, timber hitch, scaffold hitch, barrel hitch, half hitch and rolling hitch. Correct use of chokers, spreaders, hooks and guy lines.

Ornamental ironwork and curtainwall installation, use of resin base, polysulphide base, mastic base and polybutane base sealants, methods for installing extruder aluminum frames, side jambs, sash, division and corner bars.

IRON 20/Ironwork II
Methods of post tensioning, cutting, bending and fabricating steel bars for columns, beams, floor slabs, and stirrups, detailed knowledge of bend allowances and bar lists. Procedures and methods for drilling, reaming, burning, cutting, assembling and marking steel members, procedures for riveting, plumbing, aligning and shimming. Use of splicing tools, splicing fibre rope by short splicing, long solicing, crown and back splicing, eye splicing, erecting scaffolding, falsework, use of gin poles, high lines, and tuggers. Knowledge of the care and handling of aluminum, brass, bronze, stainless steel and other forms of ferrous and non-ferrous building trim.

IRON 30/Ironwork III
Methods of handling precast and pre-stressed members, hoisting and placing precast columns, beams, roof and floor slabs, facia panels and wall panels. Splicing wire rope by short splicing, long splicing and eye splicing, breaking strains and working strengths of hoisting cables, reaving drums and sheaves. Knowledge of the layout methods for doors, frames, gratings and grills, hand rails, stairways, platforms, and miscellaneous ironwork.
Familiarization with plans and specifications establishing lines and levels, setting anchors, assembling and installing curtain wall components, levelling, aligning, securing and installing adapters, flashing and sealants.

Jewellery Arts

JWL 160/Introduction to Goldsmithing and/or Silversmithing
Branches of the industry: the jewellery craftsman, engraver, diamond and gem stone setter, silversmith. Weights and measures, polishing and plating, collection and reclaiming precious metals, sweepings. Theory of metals and materials: metals in the jewellery industry, testing metals, Canadian Precious Metals Marketing Act, chemicals, hints and recipes. Theory of gemmology: optical and physical properties of gem stones, gem testing, special gemmology, gem stones and limitations. Applied designing and modelling: aesthetics related to jewellery design, development of designs for jewellery modelling in plasticine.

JWL 161/Goldsmithing
Introduction to jewellery, history of jewellery making, tools, planishing, annealing, piercing, filing, rolling, drawing, making tubing, hard soldering, finishing and polishing metals, shaping, forming, settings, making rings, casting in cuttlefish and sand, hand-made rings, cufflinks, earrings, brooches, pendants.

JWL 162/Diamond Setting I
History of jewellery making and setting, planishing, annealing, piercing, filing, rolling, drawing, making tubing, hard soldering finishing, polishing, preparation of gravers, casting in sand and cuttlefish, centrifugal casting, hardening and tempering steel, making gravers, beading tools, properties of metal, drilling, setting stones, stone pushers and punches, retipping claws, burnishing tools, setting melee, ornamental settings, fancy shaped diamonds.

JWL 163/Engraving I
Tools, care and use of equipment, cutting, rolling, annealing, planishing, sawing, filing, drilling, piercing, making engravers' plates, assembly and preparation of gravers, drawing on metal, cutting lines and circles, burnishing, hardening and tempering of steel, monograms, basic heraldry, simple crests and coats of arms, all types of lettering, transferring designs, ornamental engraving, layout, wriggling and wide cuts, use of the engraving block, engraving on inside of rings, raised letters and designs, making steel punches, restoring and polishing, inscriptions, engraving on stainless steel, use of oval graver, machine engraving, pantograph principles, cutters and grinding machine, making templates, price calculation for engraving.

JWL 164/Silversmithing I

JWL 261/Goldsmithing
Similar to JWL 161 but at an advanced level and including production cast rings, bracelets, centrifugal casting for production, repair of jewellery, hand-made watch cases and bracelets, electro-plating.

JWL 262/Diamond Setting II
Similar to JWL 162 but at an advanced level.

JWL 263/Engraving II
Similar to JWL 163 but at an advanced level.

JWL 264/Silversmithing II
Similar to JWL 164 but at an advanced level.

Lathing

LATH 10/Lathing I
Job conduct, responsibilities, trade materials, uses, precautions, and products. Tools of trade, care and uses. Bench work routines, theory and techniques for erection of partitions, polasters, corner beads. Elementary geometry and drawings related to projects. Estimating gypsum board materials.

LATH 20/Lathing II
Drawings and erection of flat and beamed ceilings, niches, arches, geometry related to projects. Estimating for metal lath ceiling projects. Drawings for projects.

LATH 30/Lathing III
Geometry, drawings and layout for groin and dome ceiling projects. Job programming from view point of mechanic and foreman. Consideration for acoustical system, materials, erection systems and values.

Machine Shop

MACH 10/Machine Shop
Measurement: rule, calipers, micrometers, gauge blocks, sine bar and optical comparator.
Benchwork: use and care of common hand tools such as files, hacksaws, hammers and chisels. Use and care of drill press and bandsaw. Identifying metals and basic forging operations.
Shaper: principal parts and operating procedures. Grinding cutting tools, positioning ram, work holding devices. Basic machining exercises. Cutting internal and external keyways.
Lathe: principal parts and operating procedures. Grinding cutting tools, speeds and feeds. Basic machining operations; turning, knurling, drilling, reaming, boring, threading and taper turning.

MACH 11/Toolmaking
Review basic measurement: gauge blocks, sine bar, master square, profilometer, optical flats and monochromatic light source, hardness testers.
Lathe: cutting various threads, calculation of single and angular depth, checking screw threads, taper turning and calculations. Introduction to carbide cutting tools, various lathe operations.
Milling: parts and functions of various milling machines, cutter terminology and application. Indexing: repid, plain and angular. Helical and spiral milling. Grinding: selection and identification of wheels, surface grinding.
Drill Press: parts and functions. Types of operations. Bandsaw: parts and functions. Types of operations, welding, filing, sawing, etching, types of blades.
Heat Treat: basic heat treat methods, hardening, tempering, annealing, carburizing, case-hardening. Types of tool steel, identification of steels, SAE. and AISI systems.
Dies: terminology, parts anf functions, basic steps to construct a die, purchased components, springs, fasteners, die sets and automatic stops.

MACH 20/Machine Shop
Lathe: cutting multi-start, square and acme threads (external and internal). Tracer and turret lathe.
Metallurgy: heat treatment process such as hardening. Hardness tester and optical pyrometer.
Mills: principal parts and operating procedures. Cutters and their applications, attachments and their applications. Set-ups, locating and indicating procedures.
Grinding: manufacture of natural and man-made abrasives, identification and selection of grinding wheels. The use and operating procedures of bench, portable, dumore, disc and surface grinders.

MACH 21/Toolmaking
Lathe: Formulas for sharp "V", American National Form, Unified National Form, Acme, Square threads. Taper turning and formulas. Tracer turning theory.
Mills: Attachments used on mills, types of cutters, cutter speeds and feeds, factors governing speeds and feeds. Use of coolants. Indexing: review repid, plain and simple indexing. Angular and differential indexing theory, toolmaking applications. Rotary table work. Gear cutting formulas, methods of cutting gears, checking gears, types of gears and applications. Use of pantograph, tracer mills, and their toolmaking applications.
Grinding: Cylindrical grinding, review grinding wheel markings, manufacture of grinding wheels, methods of dressing, grinding faults.
Heat Treat: Purpose of heat treat. Methods of heat treat: cyaniding, carburizing, oil hardening, water hardening, air hardening, flame hardening, induction hardening, nitriding, sub-zero treatment, salt baths, hardening temperatures, quenching temperatures and media. Types of furnaces, checking hardness. Theory of pyrometers and thermocouples. Selection of steels.
Presses: types of presses, single action and double action. Power, press speed and pressure. Press accessories; die cushions, pneumatic and hydraulic. Feeders: hitch, roll, slide. Press specifications: shut height, stroke, tonnage. Press operation and safety.

MACH 30/Machine Shop
Mills: differential, angular and linear indexing. Terminology of spur gearing and problem solving. Helical milling.
Grinding: principal parts and operating procedures of cylindrical, cutter and surface grinders. Lapping, materials and abrasives. Micro-finishes and methods of checking.
Metallurgy: review of heat treat methods. Manufacture of steel. Effects of alloying elements.
Electrical Discharge Machines: parts and operating procedures. Manufacture of electrodes. Work holding devices. Dielectrics and systems of irrigation. The parts and operating procedures of the pantograph.

MACH 31/Toolmaking
Diemaking: Cutting dies; blank, pierce, shave, compound, cut-off, progressive trimming. Shaping dies: draw, form, bend, curl, bulge. Calculations; bend allowance, blanking pressure, stripping pressure, press tonnage, cutting clearance, and scrap strip. Stripping methods; urethane, rubber, spring, positive. Shear on punches and die blocks. Staggering punches. Application of clearance. Review basic die terminology. Blank sizes for drawing operations. Press brake dies and set-ups, press brake patterns. Spot welding dies. Steel rule dies, forging dies. Moulds; plastic and diecasting.
Electrical discharge machining: purpose and methods. Electrodes: manufacture and design materials. Dielectric fluids, erosion factors. Typical applications, work set-ups, finish.

MACH 110/Workshop Technology
The care and use of hand tools for metal removal, marking out and measuring. Lathe, shaper, mill and grinding machines. Precision measuring instruments, heat treatment, hardening. Projects involving benchwork, drilling, turning, milling, shaping and grinding.

MACH 120/Jig and Fixtures I
Layout procedures, fitting, fastener application, part planning, jig and fixture parts.

MACH 121/Jig and Fixtures II
Milling, welding, grinding and assembly fixtures, drill jigs.

MACH 122/Gauges
Plug and ring gauges, gap gauges, and special gauges.

MACH 123/Diemaking
Die parts and functions. Types of press tools. Die clearances.

MACH 124/Machine Shop
Fitting: filing, chipping, sawing, scraping, marking off, drilling, grinding. Introduction to lathe, parallel work, shouldering, parting, sharpening of lathe tools and drills, centre work. Theory.

MACH 125/Machine Shop
Screw cutting, chasing (flat surfaces), production of UNF, metric and special threads. Shaping machine, grinding, eccentrism and cranks, theory.

MACH 130/Workshop Technology
Machining practices: milling, turning, boring, shaping, drilling. Marking out: layout for machining operation. Fitting: application of hand tools, bench work.

MACH 137/Small Tools and Measurement
The use and care of hand tools such as files, wrenches and screw pitch gauges. The application and care of precision instruments including micrometers, vernier calipers, gauge blocks, plug and ring gauges and dial indicators.

MACH 138/Lathe and Ancillary Equipment
Centre, tracer and turret lathe operation and theory including set-ups, tools, speeds and feeds, and lubricants.

MACH 140/Benchwork
The use and care of hand tools such as hammers, files, hacksaws and scribers, the application and care of precision instruments including micrometers, vernier calipers and indicators. General construction and operation of the drill press and bandsaw, safety precautions, methods of holding work on a drill press, drill sharpening, selection and welding bandsaw blades, filing band. Basic heat treatment, furnace, quenching.

MACH 141/Lathework
Components, operating and setting-up, safety precautions, plain and taper turning, drilling, boring and threading, sharpening tool bits, tracer lathe, turret lathe.

MACH 142/Milling and Shaping
Milling machine: construction, function and operation of various types of milling machine, workholding, cutters and attachments, speeds and feeds, dividing head; plain repid and differential indexing, cutting compounds. Shaper: principal parts and operation, machining surfaces and keyways with special attention to methods of holding work, safety precautions.

MACH 143/Grinding
Surface grinder: construction and operation, mounting wheels, methods of holding work, magnetic chuck, demagnetizing, grinding work square, safety precautions. Cylindrical grinder: principal parts and operation, internal and external grinding, workholding, sharpening milling cutters, safety precautions.

MACH 144/Machine Shop
Measurement: calipers, micrometer, checking concentricity and alignment, gearing tolerances. Operation of lathe, drill press, band saw hydraulic press. Use and care of drills, dies, taps, reamers, files. Plain and taper turning, boring, threading, drilling, hand reaming and pressing. Identifying and machining common metals.

MACH 201/Manufacturing Processes
A study of the factors which determine the selection of manufacturing processes. Casting processes; sand, permanent mould, injection. The forging process. Hot working and cold working, adhesives, powdered metallurgy. Plastics, thermoplastic and thermoset: materials, fundamental characteristics, principles of main processes, design considerations, selection of materials, production methods and techniques. Welding: welding processes and their applications to product design, production techniques, and materials. Heat treatment of steels. Production machine tools. Automatic machine tools used for thread cutting, gear and cam production, computer control of machine tools. Sheet metal and heavy plate fabrication. Design and cost factors of production. Inspection and quality control. Assembly and testing.
Visits to manufacturing plants and industrial organizations will form a comprehensive part of this course.

MACH 203/Special Machine Techniques
Engraving, jig boring, jig grinding, slotting, tool and cutter grinding, turret and tracer lathe, electrical discharge machine, 3 dimensional milling, electro-chemical and ultrasonic machining, high energy forming, spinning.

MACH 204/Diemaking I
Punch press theory and operation, press brake theory and operation. Theory, development, construction and operation of the following types of dies: cut-off, trim, pierce, bending, blank, forming, compound.

MACH 205/Diemaking II
Theory, development, construction and operation of the following types of dies: progressive, draw, shaving, lancing, coining and embossing.

MACH 206/Diemaking III
Theory, development, construction and operation of most of the following dies: cold forming, bulging, swaging, broaching, assembly, sub-press, extruding, curling, side cam, horn, moulds (plastic and die cast), vacuum forming.

MACH 207/Diemaking
Press tool set ups and experiments. Safety construction, operation and maintenance of press tools.

MACH 208 (NC100)/Numerical Control
Definitions, history of machine tools, advantages and applications of NC, axis, absolute and incremental systems, point to point and continuous path systems, programming, tooling tape preparation, binary systems.

MACH 221/Machine Shop
Square threads, face plate work, milling and boring in the lathe, use of steadies, saddle boring, fly cutting. Theory.

MACH 222/Machine Shop
Milling and grinding, plain and vertical, slide milling, surface grinding. Heat treatment, hardness testing.

Marine

MAR 100/Ship Knowledge
Ship recognition, division of vessels, shipboard organization, communication on board a vessel, tonnage and draught marks, fibre rope, whippings, hitches and knots, splicing, small line, small line calculations, synthetic rope, wire rope, splicing wire rope, wire rope calculations, tackles, tackle calculations, safety equipment, life-rafts, life-jackets, fire and fire equipment, breathing apparatus, the hand lead, the ship's log, rules of the road, communication.

MAR 101/Magnetism
The magnetic compass, types of magnet compasses, terrestrial magnetism, magnets, temporary magnets, permanent magnets, calculations, how a ship is magnetized, deviation journals.

MAR 102/Chart Projection
The earth, units of measurement, chart projection problems, types of charts, chart information, chart usage, bridge navigation, soundings.

MAR 105/Meteorology
The atmosphere, temperature, water vapour, clouds, classification of clouds, instruments.
Meteorological Phenomena: Hydrometeors, other phenomena, wind, isobars, air masses and fronts, sea and swell, weather codes.

MAR 111/Ship Construction
Types of ship, construction details, structure, cargo, accommodation, engines spaces. Piping systems, methods of launching.

MAR 200/Naval Architecture
How a vessel is constructed, the mould loft, the scrieve board, construction and fabrication, launching, trials, classification, Lloyd's dimensions, the girder theory, connections, transverse section of a modern cargo vessel, shell plating, longitudinal section of a modern cargo vessel, hydrostatics and ship's stability, ship dimensions, stability, virtual centre of gravity, statical stability curves, dynamical stability.

MAR 201/Seamanship
The anchor windlass, anchors, anchor chain, anchor work, the capstan, winches, cargo handling equipment, calculations of cargo handling equipment, handling cargo with more than one derrick, calculations of handling cargo with more than one derrick, sheer legs, calculations of sheer legs, the Canadian Tackle Regulations, fire detection and extinguishing regulations, fire fighting on board, the Life Saving Equipment Regulations, the Portable Water Regulations, steering equipment, the Canadian buoyage system, the uniform buoyage system, rules of the road, communication.

MAR 202/Ship's Business
Building and naming a vessel, records kept on board a vessel, documents carried on board a vessel, documents pertaining to cargo, owner's responsibilities to the seaman, seaman's responsibilities to the owner, customs and immigration, collision, pilotage.

MAR 203/Navigation
The earth, the celestial sphere, the solar system, time, the sextant, celestial navigation, position lines.

MAR 300/Naval Architecture
Mid-line longitudinal bulkheads, general arrangements in machinery and boiler spaces, superstructures and deckhouses, deck fittings, ventilation, ballast arrangements, types of cargo ship construction, modern oil tankers, strengthening for navigation, rudders and turning, arrangements about the stern of a vessel, stability, virtual centre of gravity.

MAR 301/Seamanship
Ballast and ballast arrangements.
Cargo and cargo work: General cargo, grain cargo, coal cargo, ore cargo, liquid cargo, ventilation of cargo, timber cargo, rice cargo, fruit, meat, dangerous cargo, separation of cargo, spar ceiling, loading with electro-magnets, damage to vessel incurred while loading and discharging, the scrap log, the cargo book, calculations, oil pollution, disposal of nuclear waste.

MAR 302/Tidal Theory
Tidal definitions, causation of tides, the equilibrium theory, gravitational effects of moon and sun, the effect of declination, prediction of tides at principal and secondary ports. Admiralty methods of tidal prediction.

MAR 303/Navigation
Marc St. 'Hilaire method of position finding, usage of planets and stars, star identification, latitude by Polaris, prime vertical and meridian altitude positions, position lines, chart work, Decca systems, long-range DF.

MAR 304/Meteorology
Temperature, pressure, air circulation, principal air masses and frontal zones, climate, ocean currents, rainfall, climate in tropical belts, sub-tropical climate, local weather, weather map forecasting.

MAR 306/Magnetism
Vessel's magnetic field, permanent magnetism in a vessel, induced magnetism, permanent "B" and induced "b", heeling error, vibrating needle, methods of compass adjustment.

MAR 307/Chart Projection
Chart usage, transit bearings, lights, station pointer, use of radar in chartwork, position lines, radio bearings, special charts.

MAR 308/Engineering Knowledge
Marine boilers, scotch boilers, watertube boilers, auxiliary boilers, boiler fittings, their function and operation. The properties of steam, corrosion and upkeep. Fuels, engines, turbines, internal combustion engines, the hot bulb engine, types of pumps, refrigeration, steering gears, shaft and propeller arrangements.

MAR 400/Naval Architecture
Riveting versus welding, strength of materials, properties of metals, modern types of construction, variable pitch propellers, stability, drydocking, density, bulkheads, reports, the Ralston trim indicator.

MAR 401/Seamanship
Manoeuvring, towing, emergency towing, emergency safety operations, emergency manoeuvring, rescue at sea, accidental stranding, jury rudders, relieving tackle, collision, drydocking, abandoning ship, assistance from aircraft, assistance from the shore, metals and maintenance, mate's work record book, rules of the road, communication.

MAR 403/Navigation
The fourth year will be spent in preparation for writing the DOT examinations, special attention being given to comparison of methods of sight reduction, methods of navigation applicable to high latitude sailing, consideration of future methods of navigation, doppler as used in aircraft navigation, possibility of inertial and satellite navigation. Star identification, location of stars suitable for navigational purposes, usage of star charts, identification of stars by means of Azimuth tables, time of stars' meridian passage, location of stars on or near the meridian, location of the planets.
In addition, problems will be directed to prepare the student for his Knowledge of Principles paper.

MAR 404/Chart Projection
Practical chartwork, problems involving fixes, set and drift, current laying off, counteracting courses for current, problems involving leeway, finding the set and drift when a vessel is steering a course to counteract an estimated current, horizontal angle problems, vertical angle problems, three bearing problems, position line usage, celestial and terrestrial, DF bearings, line of soundings, usage of Decca, Loran and Consol overlay charts.
Advantage of wind and current usage, consideration of prevailing wind and currents in making passages.

Masonry

MAS 10/Masonry I
Introduction to the craft, tools and equipment, mortar mixing equipment, trade terminology, principles of bonding, introduction to shaped cuts, purpose made units, joints in brick and stone work, safety precautions, scaffolding, types of walls, efflorescence, green stain and its treatment, footings and foundations, technical workshop drawing, pilasters, buttresses, piers and columns, mortars, sands, limes, cements, manufacture of structural clay products.

MAS 20/Masonry II
Introduction to the course, power tools in the industry, time and motion study, placement organization, problems in bonding layout of patternwork, arches, workshop geometry, single and double attached piers, acute and obtuse angles, revels and rebates, radius junctions, tee junctions, modular co-ordination, safety and scaffolding, shoring-dead, raking, horizontal underpinning, mortar types, manufacture of portland cement, concrete masonry units, SCR units.

MAS 30/Masonry III
Estimating brick and mortar, modular and non-modular, workshop geometry, rat-trap bonds, Gilbreth patterns, advanced bonding in straight lengths. Reinforced grouted brick masonry, dampproofing and waterproofing site lay-out transit, fireplaces, circular work, refractories, adhesives, insulating materials, grouts, concrete, fireclays.

Mathematics

MATH 10/Mathematics
Arithmetic operations: fractions, decimals, percent. Weights and measures: units of linear, square and cubic measure. Right triangle relationships. Application to shop calculations.

MATH 11/Mathematics
Arithmetic: whole numbers, fractions, decimals. Weights and measures: units of weight, units of capacity, quantity estimating, elements of costing and estimating. Percentage: methods of calculations, profit and loss, trade discounts, simple interest, calculation of taxes. Introduction to bookkeeping: the work sheet, specified journals, financial statements.

MATH 12/Mathematics
Algebra: fundamental operations, linear equations, formula, factoring, fractional equations, laws of exponents, simultaneous equations, quadratics.

MATH 13/Mathematics
Business mathematics: fundamental operations, interest, trade discounts. Basic bookkeeping: the balance sheet, classified financial statements, specified journals. Business practice: retailing, contracts and credits, insurance, banking and interest, taxes, licensing and lease, causes of business failure, forms of organization, promotion plan and policies.
One Semester

MATH 20/Mathematics
Review as necessary all principles, operations and formulae from Term I. Mensuration: area calculations of plane figures, calculation of volume and capacity. Ratio and proportion. Algebra: fundamental operations, solution of linear equations and formulae required in shop calculations.

MATH 21/Mathematics
Arithmetic operations: whole numbers, fractions, decimals, percentage. Estimating: units, trade unit, conversion-calculation of quantity, principles of costing, the inventory. Business practice: calculation-payroll and wages, insurance, taxes, workmen's compensation, wage earner's lien. Elements of bookkeeping.

MATH 22/Mathematics
Review: geometry of plane figures. Review as necessary all principles, operations and formulae from Term 1. Geometry: angular measure, definitions and terminology, properties of triangles, properties of the circle. Computation: calculations with logarithms, calculations with slide rule.

MATH 30/Mathematics
Review as necessary all principles, operations and formulae from Term II. Algebra: exponent laws, solution of equations, manipulation of formulae. Trigonometry: solution of rightangled triangles, the oblique triangle. Practical applications of operations and formulae required in calculations of the trade.

MATH 32/Mathematics
Review as necessary all principles, operations and formulae from Term I and II. Trigonometry: trigonometric functions, solution of the right triangle, problems in surveying involving the right triangle, solution of oblique triangles, sine law, cosine law, calculations in stress and structure, problems.

MATH 100/Mathematics
Semester I: Computations with measured quantities, metric and English system. Algebra: linear equations, simultaneous equations, quadratic equations, higher degree equations. Logarithms, trigonometry: right triangle.
Semester II: Trigonometry: oblique triangle, compound and multiple angles, sum and product formula for angles, properties of triangles and circles, functional concept and functional notations, introduction to series, introduction to analytical geometry, introduction to differential calculus.

MATH 102/Mathematics

Algebra: Signs symbols, fractions, fractions used in mathematics, terms used in mathematics, evolution, involutions, base, index, coefficients, etc., addition, subtraction, brackets, use of brackets, brackets preceded by a number, substitution, multiplication and involution, division and evolution, ratio and proportion, progressions, numerical and geometrical, simultaneous equations, quadratic equations.
Geometry: How to bisect an angle, to bisect a straight line, to draw a straight line perpendicular to a given straight line from a point in the line, to draw a straight line perpendicular to a straight line from a given point external to the line, to divide a straight line into any number of equal given parts. Triangles, method of construction from given data, construction of quadrilaterals from given data, how to draw parallelograms, squares and rectangles, to draw a circle through any three given points, to describe a circle about a triangle, to inscribe a circle inside a triangle, to draw a tangent to a given circle (a) from a given external point, (b) from a given point on the circumference to draw a common tangent to two circles, on a given straight line to draw a segment of a circle which will contain a given angle, Pythagoras theorem, summary of the properties of triangles, parallel lines, circles, basic theorems, examples of to usage of geometry in navigation.
Vector Geometry: Definition of a vector, fundamental properties, linear combinations, auxiliary point technique, addition of vectors, subtraction of vectors, multiplication of vectors by scalars, rectangular systems and orientation, basis vectors and application, the complex plane, inner products, properties of inner products, components, inner product formula work.
Trigonometry: Standard position of an angle, sexagesimal measure, radian measure, relationship between sexagesimal and radian measure, expressing and angle as a decimal of a right angle, converting radian and sexagesimal measure, ratios of an acute angle, ratios of special angles, use of the natural function tables, logarithms, their usage, conversion of logarithms from the base 10 to other bases, ratios of any angle, expansion formula for compound and multiple angles, transformation formula, solution of oblique triangles, properties of triangles and polygons, trigonometric equations, inverse notation, arcs of circles and angular velocity.

MATH 103/Mathematics

Common logarithms, standard notation, volumes and surface of solids, formulae, manipulation, percentages; ratio, proportion Simpson's rules; factorization, variation, simultaneous equations; theory of indices, naperian logarithms; radian measure, trigonometry.
One Semester

MATH 104/Mathematics

Graphical work: sin, cos, tan, ± 360° sin (wt + x). Straight line; simultaneous linear equations; determination of laws of linear form; geometry; congruent and similar triangle; Pythagoras, intersections, areas, segments of circle, ellipse and parabola.
One Semester

MATH 107/Technical Mathematics

Semester I: Technical Mathematics. Review: square root, right angle triangle, fundamental algebraic equations. Review as necessary all principles, operations and formulae. Formulae: literal equations, practical applications. Ratio and proportion: direct and inverse ratios, direct and inverse proportions, practical applications.
Semester II: Algebra: exponent laws, standard numbers, linear equations, radical equations, solution of formula, simultaneous equations, graphs, logarithms.

MATH 110/Mathematics for Industry

Mathematics for industry: arithmetic processes, operations with whole numbers, fractions, decimals, square root. Percentages: simple and compound interest, trade discounts, food costs. Mensuration: weights and measures, volumetric measures, metric system. Ratio and proportion. Graphic representation. Increasing and decreasing quantities in recipes. Calculating portion costs and selling prices. Calculating portion sizes and amounts to purchase. Yield tests.
One Semester

MATH 114/Business Mathematics

Fundamental arithmetic operations: fractions and percentage, rapid calculation, computing with calculators. Interest calculations: simple interest, compound interest, interest rates. Business calculations: insurance, banking and interest, taxes, discounts.
One Semester

MATH 115/Mathematics of Finance

Interest calculation of simple interest, compound interest and discount. Variables and graphs. Linear functions, exponential functions, logarithms. Representation of data: rounding of data, scientific notation, line graphs, bar graphs, pie graph. Introduction to statistics: the histogram, the frequency polygon, frequency curves.
One Semester

MATH 116/Business Mathematics

Number systems and number representation: the radix, positional values, conversion methods. Binary arithmetic: fundamental operations. Fixed-point and floating-point arithmetic. Numerical codes. Algebra: the function concept, the linear function, systems of equations, elements of linear programming. Mathematical and non-mathematical iterative processes.
One Semester

MATH 130/Mathematics

Semester I: Arithmetic processes: fractions, decimals, square roots. Logarithms: fundamental operation. Slide rule: fundamental operations. Practical geometry: properties of triangles, circle. Areas: measurement of plane figures, the S formula. Volume: units of volume and capacity, the right prism, the cone and pyramid, the sphere and solid ring. Algebra: fundamental processes, indices, theory of logarithms, linear equations, simultaneous equations, quadratic equations, quadratic surds.
Semester II: Ratio and proportion: direct and inverse ratios, direct and inverse proportion, similar and contingent figures, variation, application to practical calculations. Trigonometry: angle measure, functions of acute angles, the reciprocal ratios, the co-functions, solution of the right triangle, application of the slide rule, application of logarithms, functions of any angle, solution of the oblique triangle, sine and cosine laws, area of triangles, application to practical problems.

MATH 131/Mathematics

Semester I: Arithmetic processes: fractions, decimals, square root. Powers of ten: the standard number, laws of indices, fundamental slide rule operations. Algebra: fundamental operations, linear equations, simultaneous equations applied to Kirchoff's Laws, quadratic equations, functional notation. Logarithms: fundamental operation, calculation of decibel and power ratios. Graphs: Cartesian co-ordinates, representation of functions. Trigonometry: angle measure, the degree, the radian, ratios of acute triangles, solution of right triangles.
Semester II: Impedance diagrams, graphs of sine and cosine functions, resolution of wave forms. Plane vectors: vector representation, vectors as complex numbers, polar quantities, conversion of rectangular and polar forms, fundamentals of vector algebra, application to LCR Circuit Analysis. Slide rule: extension of slide operations, operations with complex numbers, trigonometric solutions of triangles.

MATH 132/Mathematics

Semester I: Arithmetic processes: fractions, decimals, square roots, applied geometry, properties of the right triangle; Pythagoras' theorem, the circle, area and circumference, sectors and segments. Volumetric measure: weights and measures, capacity of tanks and piping, calculation of rates of flow. Algebra: fundamental operation, equations, linear, simultaneous, quadratic, formula, manipulation, evaluation, indices, powers of ten, standard numbers, slide rule operations. Logarithms: fundamental operations, calculations involving trade formula.
Semester II: Trigonometry: ratios of any angle, solution of right triangles, oblique triangle, sine and cosine law, resolution and composition of vectors. Proportion: direct and inverse ratios, direct and inverse proportion, application to pulleys and gears, scale conversions. Units: English units, metric units, MKS system, CGS system, conversion factors and calculations.

MATH 133/Mathematics

Arithmetic processes: operations with whole numbers, fractions, decimals, use of scales, square root. Percentages: simple interest, loans and financing, trade discounts. Mensuration: weights and measures, area of plane figures, volumetric measure, units of capacity. Ratio and proportion: direct and inverse ratios, direct and inverse proportion. Applied geometry: geometrical constructions, right angle triangle, properties of plane figures. Fundamental algebra: fundamental operations, linear equations, shop formulae.
One Semester

MATH 134/Mathematics

Semester I: Arithmetic: whole numbers, fractions, decimals, square root. Percentage: simple interest, trade discounts. Mensuration: linear measure, area measure, geometry of plane figures. Pythagoras' theorem. Ratio and proportion: similar figures, scales and scale conversions.
Semester II: Business mathematics: basic bookkeeping, retailing, insurance and investments, taxes, licensing and leases, bankruptcy and insolvency.

MATH 135/Business Mathematics

Whole numbers: fundamental operations, addition and subtraction, multiplication and division. Fractions: addition and subtraction, multiplication and division by whole numbers. Decimals: addition and subtraction, multiplication and division by whole numbers, calculations involving dollars and cents. Percentage: calculation of percent, calculation of taxes involving percent, bill total and percent increase.
One Semester

MATH 136/Mathematics

Semester I: Review of basic processes: addition, subtraction, multiplication and division of integers, fractions and decimals ratio and proportion, percentage, powers and roots, measurement of area; volume and capacity. Algebra: algebraic notation, signed numbers, equations and formula.
Semester II: Geometry: properties of geometric figures, fundamental construction. Trigonometry: trigonometric ratios, solution of right-angled triangles, sine and cosine laws, solution of oblique triangles, use of logarithms and standard tables. Shop calculations.

MATH 200/Mathematics

Semester I: Analytic Geometry, differential calculus, differentiation, practical applications.
Semester II: Integration, the definite integral: areas under curves, volumes. Introduction to differential equations. Practical applications.

MATH 201/Mathematics

Binomial theorem, permutations and combinations. Quadratic equations. Exponential functions and rate of growth. Basic computer mathematics. Statistical analysis.

MATH 202/Spherical Trigonometry:

The sphere, great and small circles, lune, spherical angles, spherical triangles, equality of triangles, concurrence of lines within the triangle, solution of spherical triangles, the sine formula, the cosine formula, the haversine formula, the four-parts formula, polar triangles, solution of right-angled and quadrantal triangles, Napier's rules, area of a line, spherical excess, terrestrial and celestial spheres, projection on the plane of the rational horizon, supplemental theorems, identities, Delambre's Analogies, Napier's Analogies, Legendre's theorem. *Introduction to Calculus:* Binomial theorem, binomial expansion, the general term expansion of (1 plus X)n, Pascal's triangle of factors, expansion of (A plus X)n, solution of roots, negative and fractional indices, exponential series, origin of compound interest, law of organic growth, evaluation of epsilon, expansion of e^x and e^{-x}, graphs of exponential functions, exponential growth and decay, Napierian logarithms. Differential Calculus. Variation of a function, gradients of curves, rate of change, slopes of linear and non-linear functions, tangents to curves, calculus notation, the meaning of differentiation, the differential coefficient, limits, the limit of a function, calculation of limits, differentiation from first principles, differentiation by rule, sum and difference quantities, products and quotients, successive derivatives, differentiation by substitution, function of a function, exponential and logarithmic, kinematics, trig. functions. Integral Calculus, the meaning of integration, integration as the reverse of differentiation, the indefinite integral, integration of algebraic expressions, constant of integration, evaluation of the constant, trigonometric exponential and logarithmic fractions, integration as a summation, the definite integral, integration between limits, area under the curves.

MATH 203/Mathematics

Calculus: Differentiation x^4 function of maximum and minimum; A and G series; binomial theorem, indices; vector addition complex numbers, De Moirves theorem.

MATH 204/Mathematics

Calculus: Slope of curves, points of inflexion. Differentiation of sum; product; quotient; integrations of ax^4 aa^x $aa^x + b \sin(ax + b)$

MATH 207/Business and Bookkeeping

Semester I: Business Mathematics. Fundamental operations: Percent, interest, trade discounts, calculation of interest charges, bank drafts.

Semester II: Bookkeeping. The balance sheet, classified financial statements, specified journals.

MATH 210/Accounting

General Accounting for the industry: bookkeeping and accounting methods as used in food service operations.

One Semester.

MATH 211/Accounting

Purpose, rules, terms used, daily, monthly record sheets, wage and petty cash records, cheques, statements, other records, profit and loss sheets, expenditures, summaries, operation of cash registers, handling money, introduction to cost control, business percentages, formula costing.

One Semester.

MATH 214/Business Mathematics

Elements of matrix arithmetic. Sequences. Series and progressions. Boolean tables. Analysis of logical relations. Application to symbolic coding. Introduction to the theory of probability. Introduction to statistics: rounding off data, presentation of data. Forms of graphical representation: linegraphs, bar graphs, the histogram, the frequency polygon, the frequency curve.

One Semester.

MATH 215/Statistics

The elements of statistics as applied to business. Treatment of numerical data: graphical representation, the analytic method. Frequency distributions, measures of central tendency and spread. Elementary probability theory. Introduction to time series and forecasting. Index numbers and their application.

One Semester.

MATH 302/Mathematics

Differential Geometry: Elementary concepts, re-examination of the cartesian system, graphs, concept of ordered pairs, of numbers, functions, concept of projection on a straight line, directed line segments, length of line segments.

Loci and their equations, identification of algebraic and geometric forms, straight line, circle, ellipse, hyperbola, parabola, conic sections, polar co-ordinates, parametric equations, loci in three dimensional space, thoughts on space, Euclid's common-sense space, Rieman's unconventional space.

Calculus: Binomial Theorem, negative and fractional indices, compound binomial expressions, product of binomials.

Exponential Series: Exponential equations, transfer of base, solution of series, compound exponential expressions, hyperbolic functions.

Differential calculus: Rates of change, maxima and minima, application to areas and volumes, trigonometric functions, compound and multiple angles, hyperbolic functions, applications of calculus, partial differentiation, implicit functions, differential equations.

Integral calculus: Integration by substitution, areas under curves, volumes generated by the rotation of curves, mensuration, proof of formulae, centroids and centres of gravity, Pappus theorem, Guldin's theorem, moments of inertia, moments of area, moments of volume.

MATH 303/Mathematics

Integration by substitution, by parts, definite and indefinite fractions, partial fractions. Applications of calculus; bending beams, power, rates of change, velocity, acceleration.

One Semester.

MATH 304/Mathematics

Integration, areas under curves, moments of inertia, of volume, of area, volumes of revolution, parallel axis, centres of pressure, centres of gravity; RMS values. Co-ordinate geometry: equations of straight lines, parabola, hyberbola, tangent, normal, parameters.

One Semester.

MATH 402/Mathematics

A review where applicable for the preparation for writing the DOT examinations. Practical application of Mathematics, the derivation of the various mathematical tables, Burdwood's Azimuth Tables, Davie's Star Tables, The Altitude-Azimuth Tables, duration of daylight and darkness, time of sunrise and sunset, time of moonrise and moonset, time, location and altitude of various stars used for navigational purposes, errors involved in calculations.

Great circle sailing. Initial course, final course, distance, latitude and longitude of the vertex, points, along the course, their latitude and longitude, finding the course and distance by usage of the ABC tables.

Composite great circle sailing. Calculations involved in the usage of composite great circle sailing.

Mechanics

MECH 100/Mechanics

Semester I: Statics: force systems, concurrent co-planar force systems, resultants of force systems, forces in equilibrium, forces in structures, method of sections, centres of gravity and centroids, moment of inertia of static bodies. Work energy and power.

Semester II: Machines: dynamics: velocity and acceleration, displacement, sign convention, laws of motion, Galileo's equations, inertia force, angular displacement velocity, acceleration units, radius of gyration, work, energy, and power, impulse momentum impact.

MECH 102/Mechanics

Semester I: Forces, concurrent and concurrent coplanar. Forces—friction. Centroids and centres of gravity.

Semester II: Dynamics: velocity and acceleration, displacement, sign convention, Galileo's equations, motion due to gravity, angular motion, impulse, impact, momentum.

MECH 110/Mechanics of Materials

Semester I: Statics review: forces in structures, stress and deformation, stress and strain, Young's Modulus of elasticity. Riveted and welded joints, torsion.

Semester II: Centroids, moment of inertia. Beams, stresses in beams, deflection of simple beams, thick and thin wall cylinders, combined stresses. Point and distributed loadings, columns.

MECH 210/Mechanics of Materials

Semester I: Advanced calculations and diagrams: loading, shear forces and bending moments for simply supported beams, cantilevers and continuous beams, reinforced concrete design, typical slabs, columns, beams, foundations, stairs, cantilevers, retaining walls, structural steel design, standard sections and their characteristics, use of tables.

Semester II: Selection of sections, beams, stanchions, columns, plate girders, riveted, bolted and welded connections, steel roof truss design, details of joints.

Mechanical Technology

MECL 100/Building Construction

Site selection, excavation, soils and simple tests, dewatering well points, footings, grade beams, grillage foundations, piles, caissons, waterproofing, wood joints, sub-floor, roof carpentry, construction equipment, power and hand tools, scaffolding, hoists, shores, sheeting, needling, underpinning. Winter protection, field trips to study construction procedures, detailing construction elements, principles of survey practice.

MECL 101/Plumbing Installations

Properties and specifications of plumbing materials, methods of jointing and supporting, underground drainage design, storm, sanitary and combined systems, municipal sewage designs and sewage treatment, inspection of plumbing installations, types and purposes of vents and venting specifications, sizing of vents, drains and stacks, municipal water treatment, cold and hot water systems for buildings, types and location of valves, hot water tanks, safety valves.

MECL 102/Steamfitting Installations

Boiler designs and specifications, properties of fuels, heat calculation, temperature and pressure relationship, coefficients of building materials, heat loss calculations, sizings and selection of boilers and circulating pumps, radiator design, thermostatic and motorized valves, gravity heating systems, forced heating systems, zoning, testing, special controls and devices, baseboard heating, high temperature high pressure systems, design, purpose and location of convertors.

MECL 103/Principles of Refrigeration
Principles of refrigeration, pressure, enthalpy diagrams, evaporators, metering devices, compressors, condensers, accessories, controls, psychrometric charts, tools, tube bending, silver brazing, flaring, system construction and testing, troubleshooting.

MECL 200/Building Construction
Quantity surveying, methods of measurement, take-off and calculations of simple structures, contracts and specifications, contract law, standard forms, on-the-job modifications, building construction drawings, reinforced concrete, structural steel, timber detailing plan interpretation, field trips.

MECL 201/Plumbing Installations
Purposes of drain plans, sizing of storm, sanitary and combined drains, special drainage equipment, oil and grease interceptors, drainage and sewage sump pumps, back flood control, indirect waste pipes, special wastes, pressures and heads of water systems, pressure reducing valves, hydropneumatic water systems, tankless booster systems, cross connections in water supply, water pipe sizing, hospital and restaurant fixtures and equipment, fire line installations, estimating.

MECL 202/Steamfitting Installations
Properties of steam, types of boilers, boiler accessories, one pipe steam cycle, two pipe steam cycle, steam traps, vapour steam cycle, condensate return pump cycle, vacuum return pump, accumulate tank, flush tank, life fitting, controls (pneumatic), temperature-pressure relationship, differential controller, selector thermostat controls, sub-atmospheric systems, exhaust steam, high and low pressure systems, feed water heaters and connections, super-heaters, and desuperheaters, economizers, injectors and ejectors, steam coils, calculations of boiler ratings and pump sizing.

MECL 203/Principles of Air Conditioning
Human comfort systems, psychrometry, load analysis, distribution of air heating systems, control systems, measuring and metering instruments, electrical and pneumatic controls.

Metallurgy

MET 100/Metallurgy
Atomic theory of metals: metallic states, grain formation and growth, metal deformation, mechanical properties, heat treatment of metals. Iron and steel: iron-carbon equilibrium diagram, types, properties and uses of cast iron, production, types, properties and uses of steel. Production, properties and uses of non-ferrous metals: aluminum and its alloys, copper and its alloys, magnesium and its alloys, nickel and its alloys, lead and its alloys.

MET 109/Metallurgy
Materials used in the construction of marine boilers and engines. Sources of various metals. Production methods of steel and iron. Castings. Steel and iron process. Steel and iron treatment. Various types of steel and iron. Steel alloys. Strength and composition of steel, iron and steel alloys. Properties of various ferrous metals. Testing.

MET 110/Metallurgy
Non-ferrous metals: sources and manufacturing methods, properties, treatments. Various alloys and their composition and properties. Strength and testing.

MET 130/Metallurgy I
An introduction to the base metals commonly used in the watch-making and jewellery trades. A more complete coverage in the precious or "noble" metals, namely the mining, refining and preparation from the raw ores to the finished metal as used by the craftsmen.
An introduction also to the acids and liquids commonly used in cleaning, soldering, etc., in each of these affiliated trades.

MET 131/Metallurgy II
An introduction to the methods of testing yellow and white metals to enable the craftsman to buy old precious metals with the accuracy required to make a profit. A more complete coverage of the precious metals which the jeweller as well as the watchmaker buys, sells or repairs in his normal daily operations.

MET 132/Metallurgy
Iron, steel, wrought iron, cast iron, alloy constitution, diagrams, iron, Fe 3 C System, heat treatment, physical metallurgy, alloy steels, physical testing, non-ferrous metals.

MET 300/Metallurgy
Structure and states of metals and compounds. Physical and mechanical properties of metals. Solidification of metals and crystal growth. Wrought metals, deformation, recrystallizations and grain growth. Solid state reaction heat treatment. Tarnish and corrosion. Dental amalgams. Gold and its alloys, silver, platinum and copper. Base-metal alloys: chromium-cobalt, stainless steel, carbon steel, special alloys. Gold alloy soldering. Microscopic examination of dental alloys. Testing the mechanical properties of dental alloys. Wrought base metal alloys, soldering and welding.

Millwright

MILL 10/Millwright I
Use and care of hand tools, benchwork, layout and measurement, drilling, reaming, fasteners and anchors, applications and installation, lathe and milling machine operation, ferrous metals and their properties and heat treatment.

MILL 20/Millwright II
Rigging and hoisting, machines and hardware, strength of beams, power transmission devices, shafts, bearings, couplings, clutches, belts, chains gears, speed reduction units, lubrication, standard tapers, calculations, taper turning, gaskets and gasket materials, non-ferrous metals and their properties.

MILL 30/Millwright III
Pumps, compressors, packing, seals, basic hydraulic theory, hydraulic pumps, piping, motors, cylinders, valves and simple circuits, filters, strainers, transit, theodolite and levels and their application to alignment of machinery. Review of metallurgy, SAE, and AISI, numbering systems, conveyors.

Office Practice

OP 105/Shorthand
Emphasis on the development of speed and accuracy in shorthand writing and transcription. Tape and disc dictation and transcription. Introduction of terminology of related field. Practice in writing and transcribing letters, manuscripts and reports.
One Semester.

OP 106/Legal Shorthand and Transcription
Legal terminology: emphasis on the practical use of common legal terms and their application. Both dictation and transcription will be used to build familiarity and comprehension. Law reference abbreviations, law book abbreviations, form and function of footnotes. Practice in legal correspondence, reports and documents.

OP 107/Medical Shorthand
Development of shorthand writing and transcription skills. Practice in use of tape and disc dictation for medical correspondence, case histories and reports. Practical applications of medical transcription techniques.
One Semester.

OP 108/Medical Terminology
Emphasis on the practical use of common medical terms and their application. Both dictation and transcription will be used to develop familiarity and comprehension. Physiologic and anatomic terms referring to human tissues and organic systems. Use of medical dictionaries, manuals and pharmaceutical references.
One Semester.

OP 114/Office Practice
The business organization: structure and organization. The role of the secretary: duties and legal responsibilities. Office standards. Office automation: application of calculators, bookkeeping machines, dictating equipment, duplicating devices, criteria for selection of models.
One Semester.

OP 115/Typewriting
Emphasis on typing techniques and development of speed and accuracy. Practice on business letters, forms and tabulations allied to related field. Preparation of letters and standard business forms from dictation, rough drafts and memoranda. Preparation of manuscripts and proofreading.
One Semester.

OP 116/Legal Typewriting
Emphasis on legal typewriting practice. Development of speed and accuracy. Preparation of such legal forms as contracts, leases, deeds, wills. Legal correspondence, transcripts and court documents. Reference and research sources. Preparation of schedule of office procedures.
One Semester.

OP 117/Medical Typewriting
Emphasis on medical typewriting practice. Development of speed and accuracy in the preparation of such medical forms as medical records, case histories, reports and insurance forms. Practice in correspondence and manuscripts. Use of medical reference and resource materials. Preparation of schedule of office procedures.
One Semester.

Painting and Decorating

PAINT 10/Painting and Decorating I

Brushes, tools and equipment: their use, care and maintenance. Paint materials: pigments, mediums, thinners and stainers, origins, characteristics and chemical properties. Preparation of surfaces for painting. Plain painting and varnishing, lining and stencil work, colour theory and practice in colour matching, lettering, safe working practices.

PAINT 20/Painting and Decorating II

Paperhanging I: preparation of new and old surfaces to receive wallpaper, interlining and hanging of conventional wallpapers. Wood staining and varnishing, colour practice, glazing and antiquing.

PAINT 30/Painting and Decorating III

Paperhanging II: Hanging better quality wallpapers and specialty papers. Introduction to the hanging of fabrics and vinyls. Lay-out of wall surfaces. Spray painting: principles of spraying equipment, choice, care, cleaning and maintenance, paints, varnishes and lacquers applied by spray; health and safety measures.

Physical Education

PE 161/Swimming and Water Safety

Swimming is a compulsory subject for child care students. Students are expected to reach standard equivalent at least to Red Cross or Royal Life Saving Society Intermediate level.
Ability to swim and proficiency in life saving are essential skills for people who work with children, particularly disturbed or handicapped children.

Physics

PHYS 11/Applied Physics

Force: Graphical representation, triangle of forces, turning effect of a force. Strength of materials: stress and strain, factor of safety. Young's modulus of elasticity. Heat: temperature, scales, quantity of heat, effects of heat.

PHYS 12/Applied Physics

Air: Chemical and physical properties, pressure and vacuum, gauge pressure and absolute pressure. Water: chemical and physical properties, density and specific gravity, capillary action. Hydrostatics, principle of the siphon, comparison of lift pump and force pump, principle of the manometer, mercury barometer and aneroid barometer, well and cistern barometer, vacuum pump, pressure at a depth.

PHYS 13/Applied Physics

Air: Physical and chemical properties, pressure and vacuum, effects of variation in pressure on equipment, measurement of pressure, calculation of pressure in ducts. Water: physical and chemical properties, density and specific gravity, calculation of pressure at a depth. Capillarity.

PHYS 14/Applied Physics

Properties of matter: Solids, liquids, gases. Hydrostatics: atmospheric pressure, manometer, mercury barometer, gauge and absolute pressure, principle of the siphon. Hydraulics: Pascal's Laws, fluids under pressure.

PHYS 15/Applied Physics

Air: Chemical and physical properties, density and specific gravity. Hydrostatics: atmospheric pressure, pressure and vacuum, gauge and absolute pressure, measurement of pressure, pressure at a depth, total force on surfaces, effect of variation of pressure on equipment.

PHYS 17/Applied Science

Bacteriology: Type and classification of bacteria, sterilization and sanitation. Anatomy and physiology: muscular, nervous and circulatory systems. Electricity and light: alternating current of various frequencies, phoresis, electrical heating equipment; light rays, production, effects, classification. Chemistry: properties of common elements, acids and bases, chemical properties of cosmetics.
One Semester.

PHYS 21/Applied Physics

Review as necessary all principles, operations and formulae from Term 1. Properties of materials: basic metallurgy, ferrous metals. Review: Forces, principle of moments. Machines: principle of machines, mechanical advantage and efficiency, velocity ratio, level, wheel and circle, inclined plane, screw jack, gear drives, belt and chain drives.

PHYS 22/Applied Physics

Review as necessary all principles, operations and formulae from Term 1. Hydraulics: Pascal's law, transmission of pressure. Heat: temperature scales, effects of heat, evaporation, condensation, humidity. Hydrostatics: pressure head, calculation of pressure at a depth. Hydraulics: fluids under pressure, action of pressure pumps, action of the venturi, the water hammer.

PHYS 23/Applied Physics

Review as necessary all principles, operations and formulae from Term 1. Heat: Temperature scale, heat transmission. Strength of materials: Tensile and compressive stress, basic metallurgy of ferrous metals. Heat: Measurement of heat, specific heat of metals and air, calculation of heat capacity, humidity, relative humidity, effects of heat, calculation of expansion.

PHYS 24/Applied Physics

Review as necessary all principles, operations and formulae from Term 1. Gas laws: Expansion and compression of gases, Boyle's Law, vacuum pump, compression pump. Work, energy and power: units of energy, calculations of horsepower. Heat: temperature scales, calculation of heat capacity, specific heat of solids, liquids, gases, coefficients of expansion, expansion of gases, Charles' Law change of state, effect of pressure on BP and FP, sensible and latent heat, BTU graph, transmission of heat.

PHYS 25/Applied Physics

Review as necessary all principles, operations and formulae from Term 1. Heat and temperature: Temperature scales, transmission of heat, change of state, humidity, calculation of quantity of heat. Review: Pressure and force, hydrostatics. Hydraulics: Pascal's Law, fluids under pressure. Machines: principle of machines, mechanical advantage and efficiency, work, energy, power, calculation of horsepower, horsepower of motors and compressors.

PHYS 31/Applied Physics

Review as necessary all principles, operations and formulae from Terms 1 and 2. Friction: Laws of friction, effects of friction, coefficient of friction. Work, energy and power: units of energy and power, calculation of horsepower. Metallurgy: ferrous and non-ferrous metals, heat treatment.

PHYS 32/Applied Physics

Review as necessary all principles, operations and formulae from Terms 1 and 2. Machines: principles of machines, work, energy, power. Properties of water: Electrolysis and corrosion, hard and soft water, Ph factor, water treatment. Heat: The BTU, calculation of quantity of heat, latent heat, heat transfer, coefficient of expansion. Properties of materials: metallurgy of plumbing materials.

PHYS 33/Applied Physics

Review as necessary all principles, operations and formulae from Terms 1 and 2. Machines: Principle of machines, mechanical advantage and efficiency, work, energy and power, calculation of horsepower for fan motors. Properties of Materials: Metallurgy, corrosion and electrolysis, electro-potential series.

PHYS 34/Applied Physics

Review as necessary all principles, operations and formulae from Terms 1 and 2. Properties of steam: latent heat and sensible heat, saturated and superheated steam, calculation of heat content. Heat energy: Comparison of heat and mechanical energy, mechanical equivalent of heat, calculation of efficiency of heating plant, heat losses and prevention.

PHYS 35/Applied Physics

Review as necessary all principles, operations and formulae from Terms 1 and 2. Applied electricity: Fundamental units, electrical units of work, energy, power, basic circuitry. Heat: Latent and sensible heats, changes of state of refrigerants, effects of pressure upon BP and FP, mechanical equivalent of heat. Electrolysis and corrosion: Hard and soft water, water treatment. Properties of trade materials: ferrous and non-ferrous metals, stainless steel piping.

PHYS 100/Applied Physics I

Semester I: Fluids: Properties of fluids, hydrostatics, hydraulics. Heat and thermometry: The temperature scales, types of thermometers. Effects of heat: Expansion of solids and liquids, expansion of gases. Heat measurement: Units, specific heat, super heat, chemical efficiency of heating plant. Change of state: The TH diagram for water, nature of boiling and evaporization. Heat transfer: Thermal conductivity measurement, the Stefan-Boltzemann Law.
Semester II Thermodynamics: Laws of thermodynamics, heat engines, horsepower and efficiency calculations. Refrigeration, refrigeration systems, air conditioning, calculation of heat load. Sound: Characteristics of waves, measurement of sound. Doppler principle, acoustics. Lighting: Nature of light, properties of light, illumination and commercial lighting, ray optics, lenses wave optics, polarization.

PHYS 102/Physics

Introduction, time and measurements, space and its measurements, functions and scaling, motion along a straight line, motion in space, mass and the elements, atoms and molecules, the nature of gas, practical physics.

PHYS 110/Applied Physics

Semester I: Properties of matter. Systems of measurement, mechanics of rigid bodies. Principles of machines and mechanisms. Work, energy and power.
Semester II: Fluid mechanics: fundamentals of electricity.

PHYS 121/Applied Physics

Semester I: Heat and temperature, effects of heat, temperature, scales, heat units, specific heat, calorific value of fuels, elements, mixtures and compounds. Basic chemistry of combustion, chemical composition and combustion rates of fuels, transfer of heat.
Semester II: Force, work energy and power, horsepower, mechanical efficiency, belt, pulley and gear drives. Friction bearing friction, laws of friction. Electrical fundamentals, electrical circuits, Ohm's law. Electromagnetism. Principles of electrical devices.

PHYS 130/Applied Physics

Semester I Forces: Types of force, units, resultants, components of a force, force systems. Principle of moments, couples, levers. Work energy and power. Machines. Mechanical advantage, efficiency, belt and gear drives. Introduction to hydraulics, Pascal's Law.
Semester II Heat and Temperature: Effects of heat, quantity of heat. Basic fundamentals of electricity, electrical circuits, electrical devices. Hooke's Law. Stress, strain.

PHYS 131/Applied Physics
Semester I: Electricity and magnetism: electrostatics, electricity in motion, non-linear resistors, network theorems, magnetism, inductance, capacitance, principles of electrical devices. Introduction to solid state physics: physics of the vacuum and gaseous tubes, principles of solid state devices, H. Parameters. Electrical measurements: Wheatstone bridge and application, principle of measuring devices.
Semester II: Mechanics: vector representation, velocity and acceleration, Newton's Laws, circular motion, work, energy and power. Sound: vibration and waves, transmission of sound, units of measurement. Light: wave optics, ray optics, science of colour. Heat: thermometry, quantity of heat, specific heat, heat transfer, transistor heat sinks, cabinet cooling, mechanical equivalent of heat.

PHYS 132/Applied Physics
Semester I Properties of Matter: Molecular structure of matter, capillary action and surface tension, characteristics of solids, liquids, and gases, density, and specific gravity. Hydrostatics: atmospheric pressure, gauge and absolute pressure, barometry, pressure at a depth, gravitational force in fluids, water supply systems. Hydraulics: Pascal's Law, principle of hydraulic devices, principle of pneumatic devices.
Semester II Heat: Thermometry, units of heat, calorific value, specific heat, effects of heat, coefficient of expansion, change of state. Gas laws: Charles' Law, Boyle's Law. Work, energy and power: units of energy and power, horsepower, efficiency of machines, principles of machines Light: wave motion, ray optics, wave optics, interference and diffraction, polarization. Sound: units of measurement, inverse square law. Properties of materials, metallurgy of trade materials, corrosion and electrolysis. Force: force diagrams, elementary structures.

PHYS 133/Applied Physics
Air, chemical and physical properties, atmospheric pressure, pressure and vacuum, effects of variation of atmospheric pressure, manufacture of industrial gases. Water: chemical and physical properties, hydrostatics, hydraulics, Pascal's Law, principle of hydraulic devices. Strength of materials: stress and strain, basic metallurgy of trade materials. Heat: effects of heat, thermometry, quantity of heat, specific heats of trade material. Work, power and energy: units of energy and power, potential and kinetic energy. Fundamentals of electricity: DC characteristics, AC characteristics, principles of electrical devices, basic circuitry.

PHYS 134/Applied Science
Semester I Applied Physics: Measurement: metric and British units. Density and specific gravity. Heat and temperature: temperature scales, quantity of heat, relative humidity and its effects on printing material. Surface tension and viscosity. Elements of electricity: static electricity, electrical units. Light: reflection and refraction, lenses, inverse square law, colour, Mechanics: simple machines.
Semester II Applied Chemistry: The nature of matter, the three states of matter: elements, compounds and mixtures. Solutions and crystallization, evaporation. Physical and chemical changes, atoms and molecules and simple atomic theory. General properties of acids, bases and salts. Ionic dissociation and introduction to pH. Introduction to Organic Chemistry with reference to Screen Printing.

PHYS 135/Applied Physics
Properties of matter, structure of matter. Adhesion, cohesion, surface tension. Concept of force: hydraulics, pressure and density, Pascal's Law, principle of hydraulic devices, principle of pneumatic devices. Electrical fundamentals. Codes.
One Semester.

PHYS 136/Applied Physics
Semester I Heat and temperature: Effects of heat, temperature scales, heat units, specific heat, calorific value of fuels.
Semester II Structure of Matter: Elements, mixtures and compounds. Basic chemistry of combustion, chemical composition of fuels, combustion rates of fuels, transfer of heat.

PHYS 137/Applied Physics
Semester I: Work energy and power, horsepower, mechanical efficiency, torque, prony brake, belt and pulley drives, friction, bearing friction, laws of friction. Heat: effects of heat, mechanical equivalent, temperature, temperature conversion.
Semester II Basic Electrical Fundamentals: Ohm's Law, electrical circuits, cells, electromagnetism, electrical measuring instruments, thermocouples, induced voltages and transformers, auto transformers, electromagnetic generators, DC and AC motors, capacitors and capacitance.

PHYS 138/Applied Physics
Semester I Classification and Properties of Matter: Change of state; effects of temperature and pressure changes, refrigeration cycle, gauge and absolute pressure. Gas Laws: Law of Partial Pressures and Law of Volumes. Petrochemicals: properties and molecular structure of solvents and refrigerants. Properties of soaps and detergents: scale formation, electrolysis, corrosion, and preventive measures.
Semester II Measurement: Density, specific gravity, force and pressure. Lattice structure and mechanical properties of solids: stress, strain, and elasticity of materials. Measurement and transfer of heat. Effects of heat on solids and liquids; linear expansion, thermostatic controls and thermometry. Hydraulic devices. Simple machines: MA, efficiency, and friction.

PHYS 140/Applied Physics
Semester I Forces: Kinds, units, resultant, equilibrant, force systems; Principle of Momentum and couples, law, effects and coefficient of friction, centroid and centre of gravity. Work, energy and power: work done by constant and variable forces, principles, mechanical advantage, and efficiency of machines, gear and belt drives, Pascal's Law, hydraulic and pneumatic devices, potential and kinetic energy, equivalence of electrical, mechanical and heat energy, horsepower. Mechanical properties of materials: stress and strain, Hooke's Law, Young's modulus of elasticity.
Semester II Heat: Thermometry, effects and transfer of heat, specific and latent heat of metals. Classification of substances elements, compounds. Solutions and mixtures, physical and chemical properties of metals, electromotive series, corrosive of metals. Pure metals: crystalline structure of space, lattice units, allotropes, dendrites. Alloys: types of solid solutions, phases, effects of heat treatment, constitution of diagrams, metallic carbides and intermetallic compounds, formation of the eutectic and eutectoid. Magnets and magnetic substances. Light: reflection, refraction and dispersion of light, optical instruments and magnification.

PHYS 200/Modern Physics
Semester I Electromagnetism: The spectrum. Atomic physics: Bohr atom and line spectra, waves and particles, modern atomic model and Schroedinger wave equation, solid state physics, crystalline solids, classification by structure and by energy.
Semester II Structure and Behaviour of Metals: Physical states, alloy structure and behaviour of semi-conductors, theory of semi-conductors, semi-conducting materials, semi-conductor devices. Nuclear physics: introduction, relativity and the mass, energy equivalent, radioactivity, nuclear particles, nuclear energy.

PHYS 201/Physics
Light: reflection, mirror images, lenses, binoculars, telescope; refraction, index, dispersion; particle theory; waves studies; interference, Newton's law of motion: vectors, work, energy, momentum; heat.

PHYS 202/Thermodynamics
Semester I Energy Transformations: Definition of terms, the PV diagram. Laws of thermodynamics, the gas laws: characteristic gas equations, work done by gases, Joule's equivalent.
Semester II Indicator Diagrams: Calculation of thermal efficiencies, ideal engine cycles, comparison of engine efficiencies. Heat transfer: conduction by radiation. Entropy: changes of state, isobaric, isochoric, isothermal, abiabatic, and polytropic.

PHYS 210/Applied Physics
Semester I Hydraulics: Principles of hydraulic devices and systems. Pneumatics: principles of pneumatic devices and systems.
Semester II Principles of electrical systems and operating principles of electrical devices. Fundamentals of computer analysis. Codes and safety.

PHYS 310/Physics
Principle of the hydrometer, use of the hydrometer, in shipboard practice, effect of expansion and contraction in liquids and relationship to liquid cargos, a review of hydrostatics and heat, problems from general science. The manometer, thermometers. review problems from general science. Anometers, the vector principle in anometers, light in relation to its usages in navigation.
One Semester.

Plastics

PL 100/Materials/Thermoplastic
Fundamentals and characterization of polymers. Introduction to basic resins. Engineering thermoplastics and natural polymers. Identification of plastics and elastomers by simple tests.

PL 103/PL 132/Materials/Thermoset
History and introduction to polyester and epoxy resins. Reinforcements and fillers. Composites. Strength of material definitions.

PL 110/Processes/Thermoplastic
Basic theory and application of thermoplastic processes.
Mixing and dispersing, extrusion, injection moulding, calendering, blow moulding, sheet forming, sealing and welding, coating and machining.

PL 113/Processes/Thermoset
Theory and application of reinforced thermosetting plastic processes. Pattern and mould making, hand lay-up, spray-up, filament winding.

PL 120/Design/Thermoplastic
Design of plastic parts and processing equipment. Materials selection. Selection of a process. Part design, injection mould design, extrusion die design, design of moulds for hollow formed articles, auxiliary equipment.

PL 123/Design/Thermoset
Design characteristics for glass fibre reinforced plastics. Throw-away and plaster tooling. Reinforced plastic moulds and tooling. Wooden and metal moulds. Cost estimating.

PL 125/Plastic Fundamentals
Materials, processes, design, thermoplastics, and thermosets.

PL 130/Materials/Thermoplastic
Introduction to basic resins. Engineering thermoplastics and natural polymers. Identification of plastics and elastomers by simple tests.

PL 131/Materials/Thermoplastic
Thermoplastic sheets, rods, tubes and profile shapes. Solvents and adhesives. Properties of polyvinyl chloride, acrylics, polyethylene, polypropylene and other materials used in forming and fabricating of thermoplastics.

PL 132/Same as PL 103

PL 133/Processes/Thermoplastic
Basic theory and practice in the operation of processing equipment. Extrusion; injection and blow moulding.

PL 134/Processes/Thermoplastic
Basic theory and practice in the operations of sheet forming, sealing and welding, casting, coating and machining of thermoplastics.

PL 135/Processes/Thermoset
Theory and practice in pattern and mould making, hand lay-up, spray-up, filament winding.

PL 136/Design/Thermoplastic
Mould and die design, machine design. Cost estimating.

PL 137/Design/Thermoplastic
Design of machines, jigs and fixtures, tooling. Cost estimating.

PL 138/Design/Thermoset
Throw-away and plaster tooling. Reinforced plastic moulds and tooling. Wooden and metal moulds. Cost estimating.

PL 139/Design/Thermoset
Mould and die design, machine design. Cost estimating.

PL 140/Same as PL 203

PL 141/Processes/Thermoset
Theory and application of moulding thermoset materials. Matched die moulding, compression moulding, transfer and injection moulding.

PL 200/Materials/Thermoplastic
Fluorine polymers. The new plastics. Reinforced thermoplastics and elastomers. Material testing. Product testing. Material selection.

PL 203/PL 140/Materials/Thermoset
Properties, chemistry, curing and quality control for thermosetting resins. Polyesters, epoxies, alkyds, phenolics, silicones, amino resins, furanes and polyurethanes.

PL 210/Processes/Thermoplastic
Advanced theory and application of thermoplastic processes. This course covers the same processes as listed in PL 110, but in greater depth.

PL 211/Processes/Thermoset
Theory and application of moulding thermoset materials. Matched die moulding, compression, transfer, and injection moulding.

PL 220/Design/Thermoplastic
Advanced design—process selection, mould and die design, product design. Auxiliary equipment, jig and fixture design. Cost estimating.

PL 223/Design/Thermoset
Mould and die design, machine design. Cost estimating.

Plastering

PLAS 10/Plastering I
Job conduct, responsibilities, tools of the trade, aggregates, gypsum, limes and portland cement, plaster backings, solid partitions, fire ratings, types of arches, related geometry, layout, areas and estimating, construction of small moulds and bench work.

PLAS 20/Plastering II
Duties of a mechanic, duties of a foreman, use of spirit and water level, squaring of rooms, flat and beamed ceilings, running of moulds, cutting and planting run bench work, mitring, stops and returns, repair work.

PLAS 30/Plastering III
Layout for grain and dome ceilings, related geometry, arches, mitring, acoustic tile layout, different types of moulds, acoustic materials, safety practices, texture work, small castings.

Plumbing

PLUM 10/Plumbing I
Safety precautions, steel pipe, measuring pipe, linear measure, calculation of 45 offset, lead, solder, and fluxes. Types of cast iron joints, hand tools and wrenches, heat transfer, properties of water, copper D.W.V., cast iron M.J., fundamentals of a good plumbing system, drainage terms, building trap, cleanouts and location, purpose of a drain plan. How to draw a drain plan, drain design. sanitary (function of) floor drains, storm (function of) RWL foundations drains, municipal sewers, municipal drains, underground and above ground drainage materials. Joining dissimilar pipe material, pipe supports and managers. Purpose of stack elevation, plumbing fixture traps. Component parts of a stack pipe, stack footings, roof flashings, stack terminals, purposes of venting, siphonage, trap seal loss, glass pipe demo, requirements between a fixture trap and vent. Trap and vent sizes. Prohibited fittings and connections, types of individual vents, upper and lower vent connections, dual venting, how to draw a stack elevation, stack elevation, simple wet venting, fixture units and hydro loads, assignment work, simple group vent sizing.

PLUM 20/Plumbing II
Residential HW tanks and heaters, British thermal units, T. and P. valves, temp. conversion review and expand waste and vent size, review stack elevation work, expand on stack venting, stack elevation, domestic dish and clothes washers, Class I floor drains, methods of mechanical priming, drain plan, grading waste pipes, valves, location of valves, water services, meter and bypass, WC bowls, areas and volumes, pressures and heads, basic pumps, WC tanks and ball cock valves, rough-in fixture cuts, combined drainage system, drains on filled ground, datum line, instrument readings, grading assignment work, blow down tank, oil interceptors, sumps and ejectors, loop and circuit venting, stack elevation, yoke venting, offsets in stacks, combined vent terminals, grease interceptors, sleeving.

PLUM 30/Plumbing III
Pressure and heads, commercial HW tanks, indirect heaters, Domestic HW circ. lines and pumps, water hammer, water supplies to high buildings, pressure reducing valves, tempering valves, cross connection, source of water, well pumps, hydro pneumatic systems, water softeners including demonstration, fire line installation, water pipe testing, special fixture trap locations, indirect and special wastes, corrosive drainage materials, septic tanks, disposal beds, rolled offset, friction loss in water piping, semi-combined drainage system, municipal water treatment, hospital fixtures, ventilation of washrooms.

Psychology

PSY 160/General Psychology
This is an introductory course. Study of the response capabilities of human beings leads to consideration of human motivation, perception and the learning process. Theories of personality development and the concept of roles are discussed. The nature of intelligence and psychological testing together with the meaning of elementary statistical terminology are related to the study of children.

PSY 200/Psychology
A general introductory course to the study of human behaviour with consideration given to human motivation, perception, and the learning process. Theories of personality development, the concept of roles and the nature of intelligence will be discussed.
One Semester.

PSY 201/Business Psychology
Formal and informal organizations. Consumer motivation. Consumer analysis, depth interviews, attitude and opinion surveys. Theory of psycho persuasion.
One Semester.

Refrigeration and Air Conditioning

REF 10/Refrigeration and Air Conditioning I
Introduction to refrigeration history and development, thermodynamic functions and mechanical principles. Heat and temperature definitions, types of systems, refrigeration cycle, properties of refrigerants, handling of refrigerants, safety factors, compression system, types of components, evaporators, condensers, receivers, compressors, refrigerant flow controls, expansion valves, accessories, system servicing, charging and purging of systems. Refrigerant oils, installation procedures of special components, heat exchangers, accumulators, oil separators, water regulating valves, initial introduction to operation of cooling towers, evaporative condensers, early stages of psychrometrics; terminology and charts.

REF 20/Refrigeration and Air Conditioning II
Control operation, pressure and thermostatic, use of external and internal equalized valves, pressure controls, operating and limit, temperature, direct and remote applications, safety controls, DC and AC motors, motor controls, test instruments, motor starting devices, refrigeration piping considerations, piping installations. Water treatment for cooling towers and evaporative condensers. System contamination, cleanout procedures; acids in systems, testing and cleanout procedures, methods of defrosting, insulation factors, thermal conductivity, installation procedures, air removal, leak testing, charging, control setting, service analysis and operation. Review of silver brazing practices.

REF 30/Refrigeration and Air Conditioning III
Air conditioning fundamentals, properties of air, comfort zone, effective temperatures, relationship of psychrometric terms, use of the psychrometric terms, use of the psychrometric chart and application, sensible and latent heating and cooling, load calculations, types of loads, use of tables, equipment selection, coils and condensing units, low temperature applications, freezing methods. Multiple systems, piping hook-up and operational requirement, multiple system accessories, evaporator pressure regulators, crankcase regulators, check valves. Centrifugal compressors, operation and service requirements. Dehydration of equipment, use of deep vacuums, survey of refrigeration principles, preservation of foods, storage conditions, temperatures, humidity, air motion, motion, product chilling, relative humidity. Air velocity, product shrinkage, pneumatic control systems. Review of silver soldering techniques, service analysis.

REF 130/Refrigeration Theory
Introduction to refrigeration, description of history of trade, refrigeration fundamentals, heat and temperature definitions, vapor compression system, refrigeration cycle, types of systems, properties and handling of refrigerants, safety factors, system components, evaporators, condensers, receivers, refrigerant controls, pressure and thermostatic valves, safety controls, thermometers and gauges, accessories, lubrication, air conditioning controls and principles, humidity characteristics, heat loads, wet bulb, dry bulb readings, electrical controls, motors, starting devices, electrical servicing, installation problems, use of tables and charts, troubleshooting.
One Semester.

REF 131/Refrigeration Practice
Tools of the trade, characteristics of silver brazing, brazing copper joints, brazing dissimilar metals, tube bending, practical project assignments, flaring copper tubing, compressor dismantling, identification of component parts, assembly procedure of compressors, electric motor inspection, electrical control inspection, purging, leak testing, charging systems, primary system installations, servicing installations.
One Semester.

Small Business Management

SBM 10/Small Business Management
Business mathematics; fundamental operations, interest, trade discounts. Basic bookkeeping; the balance sheet, classified financial statements, special journals. Business practice; retailing, contracts and credits, insurance, banking and interest, taxes, licensing and lease, causes of business failure, forms of organization, promotion plan and policies.
One Semester.

SBM 132/Small Business Management
Semester I: Business mathematics, fundamental operations, business practice, personal finance, interest insurance, investment, business law, contracts and licensing, forms of business organization, public relations.
Semester II: Sales, proven promotional policies, advertising, collection procedures, basic bookkeeping practices, banking, taxation, uses and sources of credit.

SBM 232/Small Business Management/Bookkeeping
Semester I: Balance sheet, journal and balance sheet accounts, journal profit and loss accounts, ledger, work sheet.
Semester II: Special journals, financial statements, adjustments, closing the books, accounts payable, receivable. Special bookkeeping project.

SBM 332/Economics
Semester I: Personal money management: pensions, Capital investment, budgeting, installment buying. Credit: extended credit to consumer, personal use of credit, assisting credit agencies. Business, personal insurance: insurance as a basis for investment, relation to estate planning.
Semester II Banking: Policies and application for single ownership business. Supply, demand: elasticity as it applies to merchandise. Business cycle: fiscal, monetary policies. Human relations: graduation to the business world, responsibility, discipline, effective use of personal qualifications, courtesy in correspondence. Government law and regulations: standards applicable in business, employment, advertising, and labeling. Sales: the role of the letter in sales.

Signwriting

SIGN 130/Basic Signwriting and Introduction to Screen Printing
Materials used in the trade; selection and care of brushes and equipment, preparation of surfaces, letter practice, colour theory for signwork; trade drawing, design and layout, punctuating for signwriting, introduction to heraldry and gilding. General introduction to Screen printing. Hand cut stencil making direct and indirect stencil making, printing, hand and mechanical.

Sheet Metal

SM 10/Sheet Metal Mechanic I
Seams of trade, metals of trade, soldering coppers, forging and trimming copper, fluxes of the trade, rivets, cleats used in duct construction, equipment and tools, measurements, rules, tapes, etc., hand tools and their proper uses, hand operated bench machines, stakes of the trade and their uses. Basic pattern drafting; parallel line development of patterns for shop projects of the basic course.

SM 20/Sheet Metal Mechanic II
Shop safety, metals of the trade, new materials, bond allowances on heavy materials and aircraft sheet metal work, expansion metals, coping, flashing, metal roofing and seams used. Heating and air conditioning; meaning of air conditioning, process and comfort air conditioning; differences, control of climate, humidity and its effects, methods of heat travel, meaning of BTU Methods of finding heat loss and heat gain, furnaces; history of development: 100 BC to now, symbols used in duct design, residential duct systems, complete layout of typical small house. Pattern drafting. Radial line development and parallel line for projects fabricated.

SM 30/Sheet Metal Mechanic III
Duct construction materials, fasteners used in the trade, turning vanes used in elbows, construction of high velocity duct work, air conditioning and/or ventilation: definitions, psychromatic charts, fans and fan laws, static and velocity pressure, friction losses in fittings and meaning of the equivalent length, registers and grilles and pressure losses incurred, explanation of duct sizing methods, equal friction methods, static regain method, complete commercial and industrial duct layout by each method, types of equipment used. Pattern drafting advanced: radial triangulation methods of pattern development for shop projects fabricated in advanced course.

Screen Printing

SP 130/Screen Printing
Appreciation of basic layout, typography and illustration; hand cut stencil making. Preparation of direct and indirect stencils. Hand and machine printing on various materials and surfaces. Fundamentals of electric circuitry, printing-operation of the process camera. Line and half-tone film making.

Steamfitting

STEA 10/Steamfitting I
General introduction, safety rules, types of tools used, use and care of tools, types of piping and fittings, standard practice of measuring piping, types of valves and gauges, types of radiators, convectors, heaters and coils, expansion and cushion tanks, types of boilers used in hot water heating systems, sizing and erection of boilers, filling, testing and operating hot water heating systems, types of hot water heating systems, gravity hot water, open and closed, two pipe forced hot water, direct return reverse return, one pipe hot water, baseboard heating, radiant heating, snowmelting systems, upfed and downfed systems, basic principles of controls (hot water) methods of zoning systems.
History of heating, safety precautions, steel pipe, piping materials, pipe threads, thread and piping allowance, measuring pipe, type of hangers, hanger attachments, offset measuring, grading of pipe, expansion of pipe, transfer of heat, properties of water, temperature conversion, temperature and pressure, latent heat, specific heat, BTU calculations, valves, types of boilers, CI type and sizing, convectors, unit heaters, gravity hot water systems, direct return and reverse return, piping riser and mains, radiation below mains, expansion and cushion tanks, open to closed conversion, forced hot water systems and circulating pumps, special fittings, assignment, one pipe system, up feed, down feed, air cushion tanks (forced), single circuits, double circuit, multi-circuit, balancing systems, baseboard heating, piping elevations, isometric view, radiant heating, control.

STEA 20/Steamfitting II
Method of zoning, reasons, piping, template development, zoning piping, zoning special fittings, piping elevations, primary and secondary, convertor types, applications, three-way valves, properties of steam, boilers, one and two pipe steam system, steam traps, return trap system, return trap piping, return trap equipment, condensate return pump cycle, vacuum return pump cycle, recall temperature and pressure relationship, vacuum pump, piping, temple and development, accumulator tank, lift fitting and controls, sub-atmospheric system, heat balancer, control valve, differential controller, selector and thermostats, high pressure systems, high and low pressure systems, high pressure steam plants, super-heaters, economizers, injectors, condensers, etc.

STEA 30/Steamfitting III
Description of steam heating systems and basic principles of cooking, pneumatic controls, air-conditioning and power house work including one pipe systems, two pipe systems, vapour systems, return trap systems, condensate return pump, vacuum return systems, high and low pressure systems, types of boilers, boiler connections, supply and return mains, stop and check valves, boiler water supply and controls, feed pumps and injectors, blow down connections, types of safety valves, types and purposes of steam traps, feed water heaters, wet and dry returns, condensate receivers, accumulator tank, vacuum pumps, pressure reducing valves, economizers, air eliminators, separators, exhaustheads, condensers, evaporators.
Review of basic and intermediate course, high temperature, high pressure, hot water systems, theory of combustion, firing, fuels, refrigeration and air conditioning, gas code and fittings, rigging, introduction to pneumatic controls.

Structural Steel Drafting

STR 10/Structural Steel Drafting I
Force Systems: components, resultants, equivalence; centroids, equilibrium, force analysis of structures; stress: axial, shear, bearing: stresses on oblique planes; working stress and factor of safety; strain elasticity; shear and moment in beams, stresses in beams; drawing office procedure; fabrication of structural steel, plain material, specification; bolted connections; types of fasteners, shear and bearing in bolted connections; welded connections: weld types, welding symbols, stress in concentrically loaded welds. Smoley's parallel tables.

STR 20/Structural Steel Drafting II
Moments of inertia, radius of gyration, section modulus, flexure formula, stresses in built-up beams; deflection of beams, columns: Euler's equation, empirical formulas, design of beam bearing plates and column base plates. Fasteners in combined shear and tension; stresses in eccentrically loaded welds, special beam connections. Smoley's tables, column details.

STR 30/Structural Steel Drafting III
Combined axial and bending loads; eccentrically loaded columns; sloped and canted beam connections; moment connections; graphical and numerical stress solutions for axial stresses in trusses, truss panel point connections, bracing members, comber in trusses. Detailing of welded truss, welded plate girder. Smoley's tables.

Surveying

SURV 100/Survey Computations and Drafting
Introduction, elements of surveying, ink drawing, mechanical lettering, Ontario Land System, bearings and azimuths, survey calculations, closures, missing coures, route location plans, topographical plans, site plans, contouring, profiles. Calculations of bearings and azimuths, plotting angles, interpretation of legal boundary notes, plot of simple boundary, survey monumentation, plot of elevations, contours, profiles, topographic details, tracing in ink, mechanical lettering, review of trigonometric ratios of right angles, logarithms, areas, closures, DMDs.

SURV 101/Plane Surveying
Fundamental principles of surveying, steel tapes, chaining methods, errors in chaining, basic construction of transit, use of transit, use of theodolite, producing line, traversing, levelling, level notes, stadia, field procedure for topographical surveying, and basic construction layout.

SURV 110/Surveying
Horizontal and vertical measurement, use of survey instruments, site plan development, sub division planning, zoning by laws, legal computations and graphics, stake out of buildings.

SURV 130/Surveying
Leveling, contours, profiles, gradients, topographic plans and symbols, site plans, azimuths, bearings, Ontario Land System, legal, plans, ink drawings.

SURV 200/Survey Computations & Drafting
Review of fundamentals and elements, legal surveys, plans for land exchange, easements, expropriation. Survey calculations, route location plans, profiles, gradients, vertical curves, cross sections and earthwork quantities.

SURV 201/Advanced Plane Surveying
The field work required to produce good quality 3rd order control over a large area using geodetic co-ordinates with electronic equipment and second reading theodolite. The adjustment and computation of the results by regular methods and by electronic computer. The drafting of the final plan.
Curves: The selecting, calculating and laying out of simple curves. Typical curve problems with the greatest emphasis placed on intersections of curves with other lines. Transition curves and multiple curves. The use of computer in the solution of curve problems.

SURV 202/Photogrammetry
Theory of photogrammetry, history and development, stereoscopic observation, ground control methods, mapping procedures, mosaics, uses and applications. Ures, mosaics,uses and applications.

SURV 203/Practical Astronomy
Polaris observation for meridian, explanation, field procedure, calculation procedure, determination by astronomic observation of longitude, time, latitude, the Astronomic triangle, determination of the azimuth of a line, sun observation, correction, use of tables, calculation procedures, sufficient spherical trigonometry for the solution of all above.

SURV 204/Legal Surveying
Registry office; land titles office; history and development; types of documents and plans; government acts; expropriation procedures, plans; methods of registering; legal transfer and general procedures, deeds, description of township offices, field trips to registry, land titles and township offices.

Taping/Drywall

TA 130/Taping/Drywall
Job conduct and safety regulations. Board application, tape and types of adhesives, tools, quantity take-off, fire ratings of wall and ceiling assemblies, arch construction and fabrication, sanding, priming sealer coats, textured finishes.

Tool Design

TD 100/Jig Fixture Design I
Freehand sketching and machine drafting of basic jig and fixture designs, emphasizing current production methods and organizations.

TD 101/Jig Fixture Design II
Freehand sketching and machine drafting of advanced jig and fixture designs, emphasizing current production methods and organization.

TD 102/Jig Fixture Design III
Freehand sketching and machine drafting of assembly and welding jigs and fixtures and welding fixtures, emphasizing current production methods and organization.

TD 103/Jig Fixture Design IV
Freehand sketching and machine drafting of cutting tool design, multi-tool layouts and gauge design emphasizing current production methods and organization.

TD 110/Metrology
History and basic principles: basic instrumentation, dial gauges and test indicators, surface plates, micrometers and verniers, gauge blocks, optical instruments and testing. Surface finish screw threads, gears. Angular measurement, fixed gauges, air gauging, autometrology.

TD 200/Die Design
Freehand sketching and machine drafting of basic blanking, piercing and cut-off and bending dies.

TD 201/Die Design II
Freehand sketching and machine drafting of advanced blanking, piercing and bending dies. Introduction to basic draw dies.

TD 202/Die Design III
Freehand sketching and machine drafting of advanced draw dies and complex blank, pierce and bend progressive dies.

TD 203/Die Design—Moulds
Freehand sketching and machine drafting of plastic mold and impact extrusion die design.

TD 204/Process Engineering
Company organization, estimating, time and work study, tool economics, production control, and quality control.

TD 205/Die Design
Freehand sketching and machine drafting of basic blanking, piercing, cut-off, bending, draw and progressive dies.

Watchmaking

WATCH 130/Watchmaking Theory I
From elementary to advanced techniques applied to the watchmaker's lathe and accessories; principles of design and construction of mechanical time measuring devices; theory of basic clock escapements, their function and adjustments; theory of pendulums, balance and hairspring theory; design construction of clocks; calculations of clock gearing; weights; electric clocks, and electricity; mainspring operation and power.

WATCH 131/Watchmaking Practice I
Development of manual dexterity in the use of small tools under magnification of the eyeloupe, to fine metric measurements; hardening and tempering of carbon steel; filing. From elementary to advanced operations on the watchmaker's lathe using the various accessories; staking and removing balance staffs; truing balance wheels, poising balance wheels; colleting hairsprings; truing hairsprings in the round and the flat; overcoiling and vibrating hairsprings; installing hairsprings into watchplates.

WATCH 230/Watchmaking Theory II
Materials, history and production of jewel bearings. The laws of friction, watch disassembly and inspection, terminology. Escapement: theory and geometry, classification, description and function. The theory of oscillatory motion and its application in horology. Sources of power supply, equalization of power. Gearing theory: production of wheels and pinions, problems in depthing, torque output through the train, calculations. Watch constructions: cases, dials, movements, crystals, crowns and hands. Balance wheels, hairsprings and escapements. Watch adjustments: to position, temperature and isochronism. Balance and hairspring theory, adjustment procedures, timing machines. Automatic and calendar watches.

WATCH 231/Watchmaking Practice II
Making jewel settings, regulator repair, mainspring ends, hour wheel tubes. Pivoting, grinding, polishing and burnishing. Escapement matching, watch overhaul. Replacing balance staffs, stems, jewels, mainsprings, crowns, crystals and gaskets. Hairspring overcoiling, balance staff and winding stem making. General watch repair under conditions similar to those found in a well-run jewellery store.

WATCH 330/Watchmaking Theory III
Complicated watches: chronografs, complete phase calendar watches, timers. Electric watches: construction, problems and repair. Elementary electricity as applied to horology. Electronic watches and clocks: Bulova Accutron, Astro-chron; Master and slave systems.

WATCH 331/Watchmaking Practice III
General repair work on standard and complicated watches. Servicing electric and electronic watches. Trouble shooting and estimating. Organization of materials and supplies.

Welding

WELD 10/Welding
Personal safety precautions, safety in handling and using oxy-acetylene equipment, welding terminology, assembly and disassembly of equipment, regulator pressures, flame adjustments, definition of various oxy-acetylene processes, basic weld joints. Practical exercises in fusion welding of mild steel in the flat position and manual torch cutting using oxy-acetylene equipment.

WELD 11/Welding
Arc welding safety precautions, arc welding terminology, care and use of auxiliary welding equipment, basic techniques used in the arc welding of mild steel, explanation of alternating and direct welding current, shielded arc electrodes and metal transfer. Practical arc welding of fillets in the flat and horizontal position with stringer bead and weave techniques using rutile type electrodes.

WELD 20/Welding
Review of Welding 10, construction of cylinders, construction and operation of welding and cutting torches, construction and operation of regulators. Practical exercises in fusion welding and braze welding in the flat and horizontal positions using oxy-acetylene equipment.

WELD 21/Welding
Review of Welding 11, electrode classification and color codes, factors governing the selection and use of arc welding electrodes, polarity, weld faults. Practical arc welding of fillets in the horizontal position with single and multiple pass techniques using iron powder and low hydrogen type electrodes.

WELD 30/Welding
Review of Welding 10 and 20, welding gases, weld faults, edge preparation, distortion, theory of oxy-acetylene cutting, welding and brazing of various metals. Practical exercises in fusion welding and braze welding in the horizontal and vertical positions, manual torch cutting using oxy-acetylene equipment.

WELD 31/Welding
Review of Welding 11 and 21, power sources, arc blow, plate and edge preparation, carbon arc gouging, arc welding procedures used for the welding of various metals. Practical arc welding of fillets in the horizontal and vertical positions using cellulose and low hydrogen type electrodes.

WELD 40/Welding
Review of Welding 10 and 20, welding gases, weld faults, edge preparation, distortion, theory of oxy-acetylene cutting, welding and brazing of various metals, manufacture of oxygen and acetylene, pipe joint preparations, oxy-acetylene welding rod specifications. Practical exercises in fusion welding and braze welding in the horizontal and vertical positions, manual torch cutting using oxy-acetylene equipment, welding of pipe in rolled and horizontal position.

WELD 41/Welding
Review of Welding 11 and 21, power sources, arc blow, plate and edge preparation, welding sequence, carbon arc gouging, expansion and contraction of metals, causes and control of distortion, testing of welds, testing of operators. Practical arc welding of fillets in the horizontal and vertical positions using cellulose and low hydrogen type electrodes, welding of butt joints in the flat and horizontal positions using cellulose and low hydrogen type electrodes.

WELD 50/Welding
Personal safety precautions, welding terminology, safety in handling and using oxy-acetylene equipment, assembly and disassembly of oxy-acetylene equipment, regulator pressures, flame adjustments, construction of cylinders, construction of operation of regulators, construction and operation of welding and cutting torches, definitions of various oxy-acetylene processes, basic weld joints. Demonstrations of oxy-acetylene welding and brazing using various types of filler alloys. Practical exercises in fusion welding of mild steel in the flat position using oxy-acetylene equipment.

WELD 51/Welding
Review of Welding 11, electrode classification and color codes, factors governing the selection and use of arc welding electrodes, polarity, weld faults. Practical arc welding of light gauge mild steel using rutile type electrodes.

WELD 61/Welding
Arc welding safety precautions, arc welding terminology, care and use of auxiliary welding equipment, basic technique used in the arc welding of mild steel, shielded arc electrodes and metal transfer, electrode classification, polarity, carbon arc brazing. Practical arc welding of various joints using rutile and cellulose type electrodes on heavy and light gauge mild steel, carbon arc welding on galvanized sheet.

WELD 71/Welding
Arc welding safety precautions, arc welding terminology, care and use of auxiliary welding equipment, basic techniques used in the arc welding of mild steel, shielded arc electrodes and metal transfer, electrode classification, selection and use of arc welding electrodes, explanation of alternating and direct welding current, polarity, power sources, arc blow, edge preparation. Practical arc welding of fillets in the flat, horizontal and vertical positions using cellulose type electrodes.

WELD 81/Welding
Personal safety precautions, welding terminology, care and use of arc welding equipment, explanation of alternating and direct welding current, polarity, arc blow, shielded arc electrodes and metal transfer, electrode classification and color codes, factors governing the selection and use of electrodes, weld faults, testing of welds, causes and control of distortion. Demonstrations of electric arc welding and inert gas welding (TIG). Practical arc welding of fillets in the flat and horizontal positions with stringer bead and weave techniques using rutile type electrodes.

WELD 100/Pipe Welding Processes
Theory: Further study of oxy-acetylene, electric arc, tungsten inert gas and gas metal arc welding and their applications to pipe welding. Industrial and transmission specifications. Electrode specifications. Power sources. Use of special equipment. Pipe preparation, preheating and postheating, purging procedures, welding procedures, welding techniques on carbon steel, stainless steel and aluminum pipe. Weld testing, codes.
Practice: Introductory all-position butt and fillet welds on mild steel, using oxy-acetylene, electric arc, tungsten inert gas, and gas metal arc processes. Use of bevelling machines for pipe preparation. Electric arc welding on schedule 40 and 80 carbon steel pipe using cellulose and low-hydrogen electrodes. Uphill and downhill welding. Oxy-acetylene welding of pipe up to and including 4" diameter in all positions, tungsten inert gas welding of carbon steel pipe in all positions, gas metal arc welding of schedule 40 pipe using the uphill and downhill techniques. Weld testing.

WELD 101/Tungsten Inert Gas Welding
Theory: Description, characteristics, applications, safety. Power sources, auxiliary controls, coolants, torches, flowmeters, shielding gases, gas cups. Tungsten electrodes, filler rods. Joint design, metal preparation. Welding techniques for various types of metals in all positions, purging procedures, operating difficulties. Weld testing.
Practice: Welding carbon steels, stainless steels, and aluminum alloy, in all positions; using edge, corner, tee, lap, and buttjoint preparations. Welding various joints in stainless and aluminum tubing. Weld testing.

WELD 102/Semi-Automatic and Automatic Welding Processes
Theory: Theory and operation of metal inert gas welding, CO_2 short circuiting, CO_2 fluxed core wire, open arc, submerged arc, and stud welding. Theory of resistance welding and semi-automatic and automatic applications. Power sources and auxiliary equipment. Selection of filler wire and shielding gases. Metal preparation and joint design. Purging procedures, welding techniques, correction of operating difficulties and maintenance. Weld testing.
Practice: Metal inert gas welding of aluminum in all positions. CO_2 short circuiting welding of carbon steels in all positions. Argon-oxygen welding of stainless steels in all positions. CO_2 fluxed core wire and open arc welding of carbon steels in the flat and horizontal positions. Semi-automatic submerged arc welding of carbon steels in the flat and horizontal positions, stud welding. Weld testing.

WELD 103/Industrial Welding Applications and Shop Procedures

Theory: Theory and operation of fabrication processes including tools and equipment, measuring and layout, cutting, bending, grinding, punching, and drilling; use and design of jigs and fixtures. Theory of various welding applications including resistance, submerged arc, electroslage, thermit, atomic hydrogen, plasma arc, electric arc, oxy-fuel gas welding and cutting. Process and equipment selection. Quality control and codes, weld testing and inspection, estimating, shop and production planning, supervision.
Practice: Shop preparation and welding of assemblies involving the use of structural section, sheet, plate and pipe using electric arc, oxy-acetylene, ITG, and semi-automatic equipment. Setting up welding equipment. Laboratory practice in testing of weld specimens using the following standard destructive and non-destructive methods: tension, headness, impact, fracture, bend, ultrasonic, magnetic particle, dyepenetrant, macroscopic, visual. Interpretation of radiographs.

WELD 130/Oxy-Acetylene Welding, Brazing and Cutting

Theory: Safety precautions, terminology. Assembly and disassembly of equipment, care of equipment. Types of flames and their uses. Joint design. Weld faults. Repair of castings. Handling of oxygen and acetylene. Testing of welds and operators.
Practice: Fusion welding and braze welding. Cutting with manual and semi-automatic equipment.
One Semester.

WELD 131/Electric Arc Welding

Theory: Safety precautions, terminology. Striking the arc, weld faults. Power sources, auxiliary equipment, care of equipment. Alternating and direct current, polarity, arc blow. Shielded arc electrodes and metal transfer. Electrode classification and color codes, electrode coatings, selection and use of electrodes, storage of electrodes. Plate preparation. Repair of castings, arc cutting and gouging. Testing of welds and operators, codes. Manufacture and uses of ferrous metals. Principal alloying elements. Identification of metals. Heat treatment, distortion.
Practice: Welding of all joints in all positions using various types of electrodes and various thicknesses of metal.
One Semester.

WELD 132/Welding Metallurgy and Destortion

Manufacture, composition and uses of iron, steel and other ferrous and non-ferrous metals, principal alloying elements, identification of metals, heat treatment, distortion, causes and control.

WELD 133/Inert Gas Welding

Description, safety precautions, welding equipment, welding techniques. Practice: welding on carbon steel sheet, aluminum, stainless steel using the tungsten inert gas process and practice welding with semi-automatic equipment using steel and aluminum filler wire.

WELD 134/Pipe Welding

Power sources, electrode specifications, pipe preparation, welding techniques. Practice: welding using oxy-acetylene and electric arc processes.

WELD 135/Fabrication

Preparation of plate, pipe and structural sections for welding, welding procedure, control of distortion, practical project work using pipe, sheet and structural sections fabricated to specifications.

WELD 140/Oxy-Acetylene Welding, Brazing and Cutting

Theory: Safety precautions, terminology. Assembly, disassembly, care and maintenance of equipment; construction and operation of welding and cutting equipment. Types of flames and their uses. Principles of cutting. Manufacture, storage and handling of oxygen, acetylene and other welding gases. Joint design. Fusion welding and braze welding techniques used on various metals. Weld faults, repair of castings. Testing of welds and operators, codes.
Practice: Fusion welding and braze welding of all joints in all positions. Silver brazing on ferrous and nonferrous metals. Fusion welding of small diameter pipe, repair of castings. Cutting with manual and semi-automatic equipment.
Two Semesters.

WELD 141/Electric Arc Welding

Theory: Safety precautions, terminology. Striking the arc, welding techniques and procedures. Weld faults (causes and control). Power sources, auxiliary equipment, care and maintenance of equipment. Alternating and direct current, polarity, arc blow (causes and control). Shielded arc electrodes and metal transfer. Electrode classification and color codes, analysis of electrode coatings, factors governing the selection and application of electrodes, storage of electrodes. Plate preparation and joint design. Arc welding techniques for various metals, repair of castings, arc cutting and gouging, carbon arc welding and brazing. Testing of welds, testing of operators, codes.
Practice: Welding of all joints in all positions using various sizes and types of electrodes and various thicknesses of metal. Repair of castings, carbon arc gouging.
Two Semesters.

WELD 142/Fabrication

Theory: Preparation of plate, pipe and structural sections for welding. Welding procedure. Practical project work using pipe, sheet and structural sections fabricated to specification. Manufacture, composition and uses of iron, steel and other ferrous and non-ferrous metals. SAE specifications. Identification of metals. Heat treatment, distortion (causes and control).
Two Semesters.

WELD 143/Inert Gas Welding

Theory: Description, safety precautions, welding equipment, welding techniques.
Practice: Welding on carbon steel sheet, aluminum, stainless steel, using the tungsten inert gas process and practice welding with semi-automatic equipment using steel and aluminum filler wire.
Two Semesters.

WELD 144/Pipe Welding

Theory: Power sources, electrode specifications, pipe preparation, welding techniques.
Practice: Welding, using oxy-acetylene and electric arc processes.
Two Semesters.

WELD 321/Welding

Theory and practice of gas and electric welding, brazing, soldering, preparation of welds, preheating and fast-welding treatment.

Graphic Design and Production:
Burton Kramer + Associates, Toronto

Type Setting:
Cooper & Beatty, Limited, Toronto

Offset Lithography:
Carswell Printing Company, Toronto